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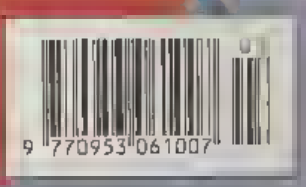

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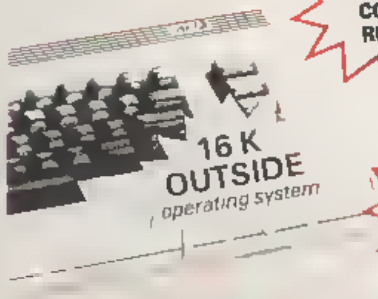

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EDITORS COMMENT

Before we get down to some serious business like thumbing through this months issue, I would like to make a couple of comments regarding the contents

We were going to start a brand new series on introducing MACHINE CODE programming for the complete novice However, due to the fact that we have an eighteen page pull out catalogue, we have had to hold the start of the series over until next month. My apologies to JOHN and to you, the readers.

There appears to be a general upsurge in the number of people that are now using that great utility S.E.U.C.K. This can be seen by the two utilities on this months disk: S.E.U.C.K. EXTENSION KIT and S.E.U.C.K. WITH MUSIC.

I am happy to report that we had a tremendous response to the CDU SURVEY. The replies are currently being analysed and the results will be known shortly. A couple of points that come to mind immediately are as follows;

1. TECHNO-INFO is the 2nd favourite aspect of CDU This is a very encoutaging result both for myself and for JASON
2. We seem to have the correct balance of progtams and articles (At least for the majority of you that is).
3. Practically everyone is pleased with the new format and layout of the magazine. This brings a lot of personal satisfaction to both myself and MARK, the designer.

That's enough of my waffling. Load up the disk and go!

DISK INSTRUCTIONS

Although we do everything possible to ensure that CDU is compatible with all C64 and C128 computers, one point we must make clear is this. The use of 'Fast Loaders', 'Cartridges' or alternative operating systems such as 'Dolphin DOS', may not guarantee that your disk will function properly. If you experience problems and you have one of the above, then we suggest you disable them and use the computer under normal, standard conditions. Getting the programs up and running should not present you with any difficulties, simply put your disk in the drive and enter the command

LOAD" MENU",8,1

Once the disk menu has loaded you will be able to start any of the programs simply be selecting the desired one from the list. It is possible for some programs to alter the computers memory so that you will not be able to LOAD programs from the menu correctly until you reset the machine. We therefore suggest that you turn your computer off and then on again, before loading each program

HOW TO COPY CDU FILES

You are welcome to make as many of your own copies of CDU programs as you want, as long as you do not pass them on to other people, or worse sell them for profit. For people who want to make legitimate copies, we have provided a very simple machine code file copier. To use it, simply select the item FILE COPIER from the main menu. Instructions are presented on screen.

DISK FAILURE

If for any reason the disk with your copy of CDU will not work on your system then please carefully re-read the operating instructions in the magazine. If you still experience problems then:

1. If you are a subscriber, return it to:
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Telephone; 0442 876661

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Within eight weeks of publication date disks are replaced free.

After eight weeks a replacement disk can be supplied from INTERCEPTOR GROUP for a service charge of £1.00. Return the faulty disk with a cheque or postal order made out to INTERCEPTOR GROUP and clearly state the issue of CDU that you require. No documentation will be supplied. Please use appropriate packaging, cardboard stiffener at least, when returning disk. Do not send back your magazine, only the disk please

NOTE: Do not send your disks back to the above address if its a program that does not appear to work. Only if the DISK is faulty. Program faults should be sent to: BUG FINDERS, CDU, Alphavite Publications Ltd, Unit 20, Potters Lane, Kiln Farm, Milton Keynes, MK11 3HF. Thank you.

SPRITE MASKER

Sprite designing and overlaying explained

SIMON HARTLEY (PSI)

Lots of material has been published in magazines and books on the subject of sprites on the C64. This program attempts to make things a little easier for the newcomer to understand.

LOADING

To load the sprite masker, type LOAD "SPRITE MASKER V1",8 1 <RETURN> or select from the CDU menu, when the program has finished loading type RUN and press return Or simply select it from the CDU menu. You will then be presented with the title screen which displays four options.

1) LOAD SPRITE LIBRARY
2) SAVE SPRITE LIBRARY
3) ENTER THE EDITOR/TOOLKIT
4) QUIT

Theses are as follows;

1) This loads a library file from disk. When this option is selected, and you have answered the query ('ARE YOU SURE Y/N ?'), you must type the filename of the file to load. On screen, the input will have the prefix 'BANK>' this simply tells the user that this is a library sprite file and it will be saved at the start of the file name. The prefix can, however, be deleted and a full 16 character filename entered. Please note that the 'BANK>' prefix simply means the library sprite file and should not be confused with video banks of the commodore machines.

2) After the query is answered, this option saves a library sprite file with the prefix 'BANK>' Again, this prefix can be deleted.

NOTE:- AT ANY TIME DURING ANY EILENAME INPUT A DISK DIRECTORY CAN BE DISPLAYED BY PRESSING <$>.

3) This enters the toolkit section of the editor

4) This option queries your selection then if you want it to, exits the editor and resets As long as you do not wipe over the code area, the program can be recalled by 'SYS 2176'

PLEASE NOTE:- YOU SHOULD NOT GET CONEUSED WITH THE TERM 'MASK' IN THE EDITOR. WHEN I WRITE 'MASK' I SIMPLY MEAN THE MONOCHROME SPRITE OVERLAYED ON THE MULTICOLOUR SPRITE.

THE TOOLKIT

This section allows various operations to be carried out on the sprites in memory. Various keys are needed to operate the toolkit;

<F1>	Select monochrome sprite
<F3>	Select multicolour sprite
<F5>	Select both (as a mask)
+	Next sprite
-	Previous sprite
bkarrow	Return to title screen
b	Change background colour
e	Edit sprite

There are also various operations which are may be carried out on the sprite(s) selected by the function keys·

x	Flip sprite(s) on horizontal plane
y	Flip sprite(s) on vertical plane
i	Invert sprite(s) image(s)
c	Clear sprite(s) images(s)
u	Undo operations (restore sprite)
crsrs	Scroll sprite(s)

NOTE:- WHEN SCROLLING A MASKED SPRITE LEFT OR RIGHT YOU MUST MAKE SURE TO SCROLL BOTH IMAGES AT THE SAME TIME AS IT IS POSSIBLE TO SCROLL A MONOCHROME SPRITE ONE PIXEL TO EITHER SIDE WHEREAS A MULTICOLOUR SPRITE NEEDS TO BE SCROLLED TWO. IE THIS HAPPENED IT IS NO GREAT DISASTER BUT IT MERELY MEANS THAT THE MONOCHROME AND MULTICOLOUR SPRITES BECOME OUT OF SYNC. AND CAN EASILY BE CORRECTED.

L load sprite(s)
S save sprite(s)

when loading or saving sprites, the filename pretix depends on the type of sprite selected.-

TYPE	PREFIX
MONOCHROME	MONO>
MULTICOLOUR	MULT>
BOTH IMAGES	MASK>

As before, the prefix may be deleted and a disk directory may be called by pressing <$>. Colours are saved along with the sprite(s) without taking up any extra room!! this is because the commodores' sprites are $40 (64) bytes and the last byte is unused by the system so I take advantage of it by storing the colours there in the form of hi nibble/low nibble (in simple terms this is one colour*16 plus another colour). This may seem a little complicated so I will tell you how the colours are stored in memory.

1) In the last byte of the multicolour sprite I store the multicolours 1+2 as the hi/low nibble.
2) In the last byte of the monochrome sprite I store the multicolour sprites' colour then the monochrome sprites' colour as the hi/low nibbles. It is because of this reason that when a multicolour sprite is loaded, only the multicolours are loaded not the sprites' colour. I apologise for this inconvenience but it was the only way to save sprites without increasing their size which would confuse you if used in your own programs.

THE SPRITE EDITOR

This part is the section that actually allows you to edit the sprite and its mask (or if you wish just a hires or multicolour sprite on its own).
The editor is key based although you can use a joystick in port two to edit the sprite. The keys are:-

F1	Select monochrome sprite colour
F3	Select multicolour sprite colour
F5	Select multicolour1
E7	Select multicolour2
B	Change background colour
+	Increment the colour in use
-	Decrement the colour in use
BKARRW	Return to toolkit
HOME	Position cursor in the top/left of sprite
CRSRS/JOY	Move cursor
*/FIRE	Plot/remove pixel

NOTE:-WHEN YOU ARE EDITING THE MULTICOLOUR SPRITE YOU WILL PLOT A PIXEL TWICE AS BIG AS WHEN YOU ARE EDITING THE MONOCHROME SPRITE BECAUSE A MULTICOLOUR PIXEL IS TWICE AS WIDE AS A HIRES PIXEL.

TIP WHEN DESIGNING SPRITES

Always design the monochrome sprite first and then fill in the multicolours under it as you will be able to make a smoother sprite and will get less confused.
That's it, now get designing those sprites !!!

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THE SHOOT'EM UP CONSTRUCTION KIT EXTENSION

Use Sensible Software's S.E.U.C.K. for more than just shoot'em ups!

IAN GOFFE

The Shoot'Em Up Construction Kit was highly acclaimed when it was launched in 1987. The kit contains, in my opinion, one of the best GRAPHICS creation tools available for designing SPRITES and BACKDROPS. I was wondering how many readers own a copy of this excellent tool, and seeing that a few readers' games have been developed with the utility - namely - PHANTOM, B-RAID and ATLANTIS (There are others), then many of you have obtained a copy methinks.

A LITTLE BACKGRDUND

One of the main features of the kit is the background editor, in which a level is built up by simply placing pre-defined blocks of characters into a level map - the jigsaw piece technique - no less! The main principle for this article is to allow the user to load in a standard ***S.E.U.C.K.*** background file from disk, in which you have created the necessary characters and blocks, that can then be slotted into place on any one of 256 screens by using my editor. These full colour screens (Well, one colour per block as in ***S.E.U.C.K.*** of course) can then be used in your own programs by using the source file that I have included. It can be assembled by the MIKRO assemhler, 6510+, and my very own 6510 MACRO ASSEMBLER (As published in 'YOUR COMMODORE').

BLOCK CDMPRESSIDN TECHNIQUE

Allan Webb touched on this subject in his 'HIGH SPEED GRAPHICS' series that was also run in 'YOUR COMMODORE'. I intend to go one step further by presenting a comprehensive editor that complements the ***S.E.U.C.K.*** The kit uses this compression technique, which is widely used for storing many screens worth of data in a compacted form. Each block that is created within ***S.E.U.C.K.*** is made from a 5 by 5 matrix of characters, and each level is further made up of a set of blocks placed together, giving the overall effect of a full screen image. This technique of expanding blocks of characters onto the main screen has wide applications in games programs, where, on most occasions memory is at a premium. Each of my screens is 40 by 20 characters, giving a total of 800 bytes per screen. Therefore, normally for 256 screens this would need to use up 204,800 bytes of memory. (Amiga please!!) But, by using this compression technique, we can store 256 screens worth of data in only 8192 bytes, now THAT'S SOME SAVING.

THE EDITDR IN USE

The editor is operated simply by a joystick in Port 2, and additional key-presses. A large BLOCK CURSOR, a la ***S.E.U.C.K.*** is used to guide your way around the screens. The idea behind the Editor is that it allows you to flip between the 256 screens, and insert a relevant block onto that screen at the block cursor position Before you can actually see anything though you will need some of your previously designed blocks of characters that you have originally created with ***S.E.U.C.K.*** The ***S.E.U.C.K.*** background files (saved from ***S.E.U.C.K.*** from the SAVE BACKGROUNDS option within the STORAGE menu - I'm sure I don't have to tell you that!) are loaded into the editor by pressing the 'L' key. You will be asked for the filename at this stage. The filenames from ***S.E.U.C.K.*** are suffixed with a file type, in this case .B for backgrounds This can, however, be omitted from the filename that you input, only key in the main part of the name, eg GRAPHICS .B can be entered as GRAPHICS. This is achieved as the editor automatically adds an asterisk to the filename, therefore loading in any file that STARTS with the filename that you input. This is the same when loading in any screen data that you have created. (Worth mentioning, don't you think?). If you just want to get used to the editor than load up a demonstration editor, containing some blocks ready for use - the Blue Peter style, hey?

THE STATUS WINDOW

Below the main graphics area is the STATUS WINDOW, where the user communicates with the editor, and certain information is displayed. The current screen number that

is being edited is shown, alongside the block number that is to be used for inserting onto the current screen. The value given alongside "HOLDING" refers to the block that currently lies underneath the block cursor.

KEY/JOYSTICK FUNCTIONS

The block number can be changed in two ways;
NOTE: The "^" symbol equals the UP ARROW key

1. Using the "^" and "*" keys to add to or decrease the current block number.
2. Using the "G" key to GRAB a block that is under the cursor - in this case the BLOCK NUMBER will be given the value contained in "HOLDING"

The screen number can be changed by using the "+" and "-" keys to move to the next screen in either direction. There are also key-presses available to dump a screen into spare and then, if needed, copy it to another screen. This function is operated by the "F" and "T" keys to copy 'FROM' and 'TO'. Press the "F" key when on the source screen, then move to the screen that you wish to copy to, at which point you press "T". This function can also be used as an "UNDO" option. After storing the screen with "F", you may make a complete mess of it, at which time pressing "T" when on the same screen will bring back the original. (Better to be safe than sorry!). If you wish to clear out all screens by filling with a particular block then get the BLOCK NUMBER holding the desired block that you wish to fill with, then press the "E" key to erase all screens. You will be asked for confirmation of this command, pressing any key other than "Y" at this point will allow you to breathe easily once more - That's if you pressed by mistake, of course! Individual items can be saved out, these can then be loaded back for use in your own programs. The commands you require are;

S - Save screen data
A - Save attributes (Block colours)
B - Save block definitions
C - Save character set

Screens that you have designed within the editor can be loaded back by pressing the "K" key. The colour can be changed using the FIG keys, while the "@" key allows you to send disk commands, and view the disk directory - a DOS support is a good feature of any utility program, I believe.

KEY SUMMARY TABLE

+	Screen number +1
-	Screen number -1
^	Block number +1
*	Block number -1
G	Grab block
F	Dump screen into spare
T	Copy spare to current screen
E	Erase all screens with block number
A	Save block colours
B	Save block definitions
C	Save character set
S	Save screens
K	Load screens
L	Load ***S.E.U.C.K.*** background file
@	DOS support
F1	Increase background colour by 1
F3	Increase multi-colour 0 by 1
F5	Increase multi-colour 1 by 1
F7	Increase border by 1

HOW S.E.U.C.K. HANDLES BLOCK DATA

The main components of any one block in ***S.E.U.C.K.*** are the 25 characters that make up the block - the BLOCK DEFINITION - and the individual block colours. ***S.E.U.C.K.*** stores the block definitions in a 3200 byte table (128 blocks * 25 characters). The first 25 bytes in this table hold the characters used to make up block 0, the next 25 bytes for block 1, etc.
Therefore to get to the base address of any one particular block definition, we can find the offset in the definition table easily by:- OFFSET=(BLOCK NUMBER * 25). The 25 characters used in a block are then stored from (BLOCK DEFINITION TABLE)+OFFSET.
S.E.U.C.K. Initially stores this 3200 bytes from $1A00-$2680. The colour for each block is stored in a 128 byte table, so as any one block colour can be easily indexed with an offset of it's actual block number. The colour data is stored from $1900-$1980 in ***S.E.U.C.K.***
The other important part of the blocks is the actual character set, this being stored in ***S.E.U.C.K.*** under the kernal ROM, from $F800-$FFFF. However, these absolute values are irrelevant as far as we are concerned, as a standard ***S.E.U.C.K.*** background tile is saved as a single file, containing block definitions, block colour, character set and level data.

HOW THE EXTENSION EDITOR HANDLES DATA

When the extension editor loads in a ***S.E.U.C.K.*** background tile, it gives a relocated load address of $1000. As was stated, contained in this file is the data for the level map, we won't be using this, as our 256 screens are to be stored in our own format. As the background file is now located at $1000, the relevant parts of memory that we require are;

$2000-$2080 Block colours
$2100-$2D80 Block definitions
$2D80-$3580 Character set
(A copy of the character set is dumped to $F0000 for use by my program)

SCREEN DATA CREATED BY THE EXTENSION EDITOR

Each of the screens created by the editor is 32 bytes long, each byte referring to a particular block number - running from left to right - top to bottom when expanded onto the screen. The screen data runs from $4000 to $6000.

USING THE DATA IN YOUR OWN PROGRAMS

The files that you will need to view the screens from within your own programs are;

1. **Block colours**
2. **Block definitions**
3. **Character Set**
4. **Screen data**

Each file is saved from the editor; see the key function summary for actual key presses. I have supplied a source file, (VIEWSCREENS.ASM), to allow you to print any of the 256 screens. The file is well documented and should be self explanatory, if you read through it thoroughly. It is initially setup to run from address $C000 (49152 decimal), once assembled load in the following set of data that you have created within the editor.

BLOCK COLOURS (attributes)	**to $2000**
BLOCK DEFINITION	to $2100
CHARACTER SET	to $3000
SCREEN DATA	to $4000

The labels in the source file are set up to receive the data from the above addresses, note that all of the addresses are the default (can be loaded back with LOAD"filename",8,1), except the CHARACTER SET which must be relocated to $3000. These values can be easily changed in the source file to suit your own requirements. As is stated in the source file, to print a screen use;

LDA #screen no
JSR EXPASCR

This is all that is needed. By the way, how do you like my title screen? The music accompanying it was found embedded deep inside the COMPUNET front sequence from the DISKONOMISER program from the NOVEMBER '89 issue of CDU. That just about sums it all up. So come on all you graphics guys, and gals, out there. How about a bit of full screen animation by recycling the screens in quick succession, or a mega-multi screen game? Good luck and have fun.

ED'S NOTE:- LATER IN THE MAG YOU WILL FIND ANOTHER UTILITY THAT COMPLIMENTS THIS PROGRAM "S.E.U.C.K WITH MUSIC". IT'S GOOD TO SEE PEOPLE MAKING THE MOST OF S.E.U.C.K.

ADVENTURE WRITING

Another helping hand from JASON FINCH for all those budding Adventure Writers

Once again the time has come for you to indulge in another Adventure Writing article! In the January issue we looked at parsing, the action of splitting up the player's input into the different commands so that the adventure program could understand them. I laid down the main rules and ideas for the construction of a parser and hopefully some of you have managed to write one of your own. If anyone has managed to write either a BASIC or machine code one then I would really like to see it. So if you have, and you would like to share it with other readers of CDU, then please send a disk with it on, together with suitable instructions, to PARSERS (CDU/AW), 11 Cook Close, Brownsover, Rugby, Warwickshire, CV21 1NG. We will return to parsing at a later date but this month we shall concentrate on another aspect of the content of your adventure, namely other characters. We will look at how to control the player's movement with respect to those characters and how the characters will act and respond to the movement of the player. It is also important to look at how the player and the character will communicate.

INVOLVING OTHERS

The involvement of other characters is quite important as they are likely to also play an active part in your adventure - giving you advice on what to do, helping you overcome problems that need a wizard's magic, and of course the enemies who are all out to see your demise!

When I start mentioning other characters, this is is no way connected with role-playing games - there is no throwing of dice to determine who wins a battle, or elements of luck and stamina involved. In the type of adventure that we are considering, the characters need to appear to be totally real. I am not saying that in RPGs the scenarios are unrealistic, you understand! It's just that fights and friendships are handled in a different way. Of course the movement, reactions and other aspects of the other characters are all governed by how you, the programmer, write the adventure. And you will therefore need to know how to go about this and possibly also have some advice on what sort of characters may be involved. That will be the job of this month's tutorial - finding out how to go about involving others

LOOKING BACK

A reasonably well-known classic adventure was "The Hobbit" based on the novel by J R R.Tolkien. For that adventure, written by Beam Software way back in 1982, two whole new concepts were developed for the control of the other characters They were called Animaction and Animtalk (both are trademarks of Melbourne House so don't try telling people that you made them up!). Animaction was an amazing development - it gave each character a personality of its own, each character would behave following certain patterns and would be doing something all of the time as they would in reality, and it ensured that each time you played the adventure the characters wouldn't do exactly what they had done before Animaction, in my opinion, gave the game an extra bit of realism and life. Just like people, the characters were set in their ways and had habits, and they didn't perform the same tasks over and over again in the same order every time you played. The other implementation was Animtalk As the name suggests, it allowed the player to communicate with the characters - to talk with them. When this was combined with Animaction you got a good artificial intelligence. You could tell a character what to do but based on his personality he would decide whether he wanted to do it or not. Of course, today, a lot of the adventures feature concepts that allow you to talk to the other creatures But "The Hobbit" was one of the adventures that set an early standard. We will not even attempt to copy the style of Animaction and Animtalk because that would intringe copyrights. You must come up with your own methods for determining what other characters will do. They don't need to be routines as complex as those involved in the c ommercial adventures - but they do need to work.

BACK TO TODAY

So why do we need other characters? Why not just have the main character and be done with it? You can if you like, but to put it quite frankly, your adventure will be boring. There would be no chance of realistic variation each time you played and obstacles would be in set places and once solved you would be able to solve them each time you played without other characters hindering you or whatever. Ot course if your adventure is supposed to be played so that you are the solo person then that's fine. Let's consider some of CDU's adventures. "Runaway" didn't feature other characters but the adventure still worked well because in that instance, which I think is the exception and not the rule, you were meant to be isolated and have no help from others. "Kron" featured an eagle that helped you, an old man that read a scroll for you and the evil Balzan to mention just three characters. However, my one reserve there is that the characters always did the same thing. Balzan would always fire at you and the man would always read the scroll and tell you the same thing so long as you knocked on his door and kneeled - he was always there. I am being rather critical there but I believe Kron could have been made even better than it was if there weren't things like memory restrictions. Yet another excellent adventure, "The Astrodus Affair", featured other characters. They were the evil ones that you had to blow up. Other characters come in all shapes and sizes - they are not just ones that walk. You could have a phantom car that follows you around and can understand you or, as in "Kron", a bird that can help you by flying across ravines. But mainly these characters will be ones that walk, like elves and goblins or trolls. So, back to walking ones: a guard who fires at you but never says or does anything else is still another character although he is not an animated one

ANIMATION

You will probably have realised that the adventures that have been published in CDU have mainly been written using a programmer's utility - "The Quill" or "The Graphic Adventure Creator". I hope this won't put you off from trying to write your own adventure from scratch. It is obviously going to be much more difficult but you will get greater flexibility in areas such as character movement, quite a large topic, because you will be able to tailor-make your program to suit your needs. You don't really need to have dozens of characters in your adventure because that would get a little complicated when it came to programming - four or five well animated characters are better than forty or fifty poorly animated ones. Let's get back to the original question: how do you go about deciding who the characters will be and how they will react? Moreover, how do you program them, or firstly come up with ideas about how they can react differently now and then depending on other things in the adventure? Please do read on.

WHO'S WHO?

If you've got no idea as to what sort of characters you may want then read further. Firstly you must decide whether you want one character to be a sort of "special friend" that follows the player all the time or leads him to hidden places. If that is the case then you must decide whether any of the other characters are not going to trust this person that hangs around with the player. That will add a bit of variety and perhaps a problem - how will the

Lots of spells and objects make MYSTICAL an intresting adventure

player get rid of this "sidekick" so that he can communicate freely with the other character? However, I would strongly recommend against having one of the characters follow the player all the time because the player may become dependent upon this character, constantly asking it for help. Or alternatively, if you have a message like "The dwarf follows you" every time the player moves he could get very agitated. By the way, I know there are plenty of female adventurers around - I only keep referring to the player as "him" for the sake of convenience! (That should have stopped a few letters!).

You can have a happy compromise with the friendship and attraction of your characters - why not construct a character that moves around of his own accord yet never ventures so far that you can never find him? This is actually making the adventure more realistic. A friend of yours may want to go off exploring on his own but he wouldn't want to go so far that he loses you. Remember the principle of Animaction? It was realism. Of course you don't need to have any special friend at all. All the characters could be of the same status and have the same opinions of you - suspicious at the start and then a bit more friendly or a bit more hostile

To create a realistic adventure - which is in essence what we're after because the player must be able to imagine that he is actually there in this fictional world - you must, in effect, transfer yourself and your characters into your adventure scenario and imagine how they might move around. Would a shy character go anywhere in the open without you? Would a little green elf stray off a path into a cave full of trolls on purpose? A security guard would never leave the building he was patrolling, and an assistant in a library would never leave the library although that assistant may follow you if he is a bit suspicious - again, a personality is incorporated in the character

SOME IDEAS

In fictional fantasy style adventures you are likely to want some goblins, elves, trolls and perhaps a wizard or a witch. Don't forget to include realistic checks. If the bridge across a river is broken and one of your characters is not supposed to be able to get wet, then the player may become annoyed if he sees the message "The hobgoblin goes north" when he knows that a fast-flowing river is to the north. If your adventure takes place in a castle then you are likely to want guards and soldiers. A character that the player finds locked up may befriend the player if he sets him free and the player could then be taken to a secret passage or something that otherwise he would not have found. In this way there is both a problem and some character animation. The problem is: where is the passage? Of course it is up to you, the programmer, to ensure that the character does not move anywhere until you set him free - that would be pointless and ruin the effect. Other characters may stay put until you give them something as an incentive, or you tell them something. That leads me nicely into the part when I tell you what we will be discussing next month - communications

This month I hope that I have given you sufficient help in deciding how complicated you wish your character animation to be, or whether you want to have any additional characters at all. Perhaps you want them all to be semi-static. That means have characters that do and say things but those things that they do and say are always the same - they never change.

CONCLUDING

The last two articles have been quite high-powered and contained a lot of information for you to ponder over. This is mainly the reason why the series went bi-monthly. We have however, nearly finished the second most complicated aspect of creating an adventure - creating and thinking for other creatures. The most complicated being parsing which we discussed last time. Moving on to next time then, when it will be the merry month of May, we will conclude the discussing of character animation with a section on, as I have said, communications. How will the characters talk to you, and how will they react to what you have said? Next time, also, we shall have a look at how you would go about programming this animation - it's not as complicated as it first sounds, I assure you! And also how the program will inform the player of what the characters are doing. It doesn't need to say "For some reason the elf attacks the rock with the sword" if the elf is on the other side of the adventure; and it certainly doesn't want to print that up on the screen if the player is carrying the sword! So until next time, put your thinking caps on and decide what sort of characters you are going to have in your adventure. And I hope that you have already thought about your plot. If you haven't then go to the bottom of the class and do it! I look forward to talking to you again in May.

PROGRAMMING

A 'man in the street' opinion

GORDON HAMLETT

You can learn many different programming tips by reading these pages so I thought that just for a change, I would offer some from the person who is, after all, the ultimate critic. The man in the street. Someone who has actually forked out some of his or her hard earned cash for your product. It may only be a few pounds for a copy of this magazine or a budget game or it may be several hundred pounds for the latest desk top publishing package on the PC. It matters not. I, as an end user, have paid good money for your product. So what do I expect.

Am I impressed by your ability to talk to me in hex? Do your latest data compression techniques cut any ice? Do they ******* (expletive deleted - ed)

QUALITY COUNTS

All I want from a package is something that does what it says on the box. No more, no less. I am not bothered in the slightest how it achieves this. Your code may be beautifully structured or it may be a tangled mess of spaghetti. It doesn't matter at all. There are however some points that do matter, and matter a lot. Unfortunately these are the ones that a lot of programmers tend to ignore.

To start with, your program must be fully error trapped. It you give me a menu of five choices, I don't want the program to hang if I accidentally press 6. That is fairly elementary but there are varying degrees of sophistication. Suppose the program's expecting a number between 1 and 100. What will it do if I press 0 or return or enter my name or a row of asterisks? Of course you should never be in that position to start with as the program should give some sort of indication as to what sort data it is expecting. The best method I have come across to check whether or not your program is error trapped properly is what I call the little sister or brother technique. Let her play on your latest masterpiece pressing any or every key in sight. If she can't cause it to crash, then it's a fair bet that you will have no further problems in that direction.

IS IT ERROR FREE

If the first problem was minor the second annoying habit is more serious although you may not think so. This involves poor presentation of your program, particularly bad spelling. (Eds comment: A close scrutiny of this and other magazines will tell you that!!). Even if you can't spell yourself, there is always the spelling checker on your word processor. Failing that, get someone else to check your spelling and grammar for you.

Although bad spelling doesn't affect the program in the slightest (not strictly true, I've seen some adventure games where you have to deliberately misspell a word to continue!) the reason it is important is a strange one. Whereas perfect spelling gets you no bonus points at all, bad spelling gets noticed immediately and creates an atmosphere of sloppiness. The impression is given that the rest of the program will also contain mistakes. Despite what they teach you at school, good spelling does matter in the real world. And as I have said, there really is no excuse for getting it wrong.

CLEAR INSTRUCTIONS

By far the most important area of a program to an end user is the documentation. Get it right and you are well

NG TIPS

on the way to success. Get it wrong and people will soon switch to a rival product.
Take the example of a word processor. There is a pretty good chance that the user will have no computing skills whatsoever. It will have taken ages to lure a writer away from their old battered typewriter. Some indeed might still be using pen and paper. They are very wary of this new fangled technology.

KEEP IT SIMPLE

The last thing they want to read when they open the manual is a complicated series of jargon filled messages. They want something that holds their hand and leads them through the first painful steps. Indeed, it might even be worth considering an introductory booklet entitled getting started that covers things like how to load the program, save files etc. The same theme keeps cropping up as you explain the rest of the commands. The user wants to know how to do something. He does not care how it is done. All technical details can be quite easily tucked away at the end of the book in the form of an appendix.
As a case in point, I remember reviewing a word processor a few years ago. The blurb on the outside told me that I could use the companion database to set up a mail merge, feeding a series of names and addresses into a standard letter. The instruction manual was 350 pages long (250 pages only in the data base). I still haven't found out how to do it. Now this package may well have been the greatest thing since slice bread but I just could not be bothered to find out. The same sort of thing applies to your command system. Just because you know that you have to enter a three digit code at a specific place, doesn't mean that everybody else knows. You have to tell them. Remember, write the instructions for someone who has no computer expertise at all. Above, I mentioned the little sister test. Now I propose to introduce the mother and father test. Give the program to your mum or dad and see what they make of it. If they can't understand it, make the instructions clearer.

FINALLY

Do consider the presentation of your program. The first thing people do when they open the box is read the instruction book. First impressions count and it seems daft to deprive yourself of a head start.

ADVENTURE HELPLINE

JASON FINCH continues his aid to THE ASTRODUS AFFAIR

Once again the time has come for us to discover a bit more about one of the CDU adventures, that being "THE ASTRODUS AFFAIR". In the last two issues I have presented you with information about the locations and I have given each one a number. I hope that you have got both those articles because this month I shall start referring to the different areas of the adventure as location numbers, the start being location 14. This marks the beginning of your quest and the numerous problems that you will encounter whilst trying to finish the adventure. This month I will start looking at specific problems and how you can overcome them. For each problem detailed in this issue and future ones, there will be two solutions given - a written one that explains generally how to go about solving it, and a much more systematic solution explaining exactly what you will have to enter and when in order to solve the problem that you are faced with.

In "THE ASTRODUS AFFAIR" the first thing that you must do is to find the generator and get it functioning properly again. I presume that all of you have done that, but if I ignore it then there is bound to be someone who will write and tell me that they gave up because they couldn't stop dying before they had a chance to search the spacecraft. So I shall now explain generally how to go about finding and repairing the generator.

YOUR FIRST PROBLEM...

The air seems to be getting thinner... your head starts feeling very light, and your breathing becomes erratic... the air is so thin that you start coughing and clutching at your throat... asphyxiation crushes your final breath and the familiar darkness encloses as death overcomes you. My guess is that the first time you played the game, your demise was detailed as above and you suffered from that slow and painful death, finally flopping on the floor to join the rest of the decaying bodies on the Astrodus. A gruesome tale if ever there was one! But you should have soon realised that there was a reason for this, and the fact that you get the message "The lights flicker briefly" appearing now and then should have told you that the power was fading on the craft and that the life support system wasn't what it ought to be. The solution is the generator. You can't search forever to find this generator because you die - you must find it.

...AND HOW TO SURVIVE IT

You are told that there is a lot of debris and that a door blocks the exit east, so the sensible thing to do would be to try and move the debris, perhaps allowing the door to be opened. If you continue in the same direction you will eventually find a staircase and it is this you must climb in order to reach the generator. But if you try to do that, you will be told that a creature shows its lengthy canines to you and so you step back wisely. Canines are teeth of course and that is perhaps a clue - yes, indeed, you must feed this beast. Upon finding a lounge off cross-section A, you will find that someone has left an apple there - the perfect thing to keep the TORTOR happy. When you get to the top of the stairs you can go north or south, or you could go back down but that would be rather pointless! If you take the option of going through the door rather than along the corridor, you will find yourself in a damaged and dank room. You will probably be quite relieved when you see that "a dishevelled generator sits in the corner." But how do you get it working. Examination will reveal a plate and it is that that you must rotate. Then all your problems are over. If you don't want to know exactly how to do it then please skip the next section, "A detailed look"

A DETAILED LOOK

MOVE DEBRIS to allow the door to open and then GO EAST. Go EAST again to cross-section A and then NORTH to the lounge. Here you must TAKE APPLE and return SOUTH to location 16. Go EAST once more and GIVE APPLE TO TORTOR. Then go UP the staircase. When at the top, location number two, go NORTH and EXAMINE GENERATOR. On finding the plating all you have to do is ROTATE PLATING or ROTATE DIAL and everything will be fine - the air will be rapidly cleaned and you can continue.

WHAT ABOUT THE DRAWER?

What I would rate as the second problem in this adventure is how to open the drawer that you find in location 14, the Bridge of the Astrodus, where you start. On examining it you are told that there is a small slot in one side. And when you try to open it you are asked "With what?" A small slot indicates that perhaps something like a credit card is needed. So you must search around until you find an electronic card. It is in location 13 but you must work out how to get there. Another problem blocks the way though because there is a security beam and a load of cabinets that get in your way. Location 13 is a well-hidden room but with the information that I gave you in the first article you should be able to work out the directions to get there. If you want to do it yourself then skip the next section, "Opening the drawer".

OPENING THE DRAWER

From where you found the generator, you must return to the staircase and then the lounge by going SOUTH, DOWN and then NORTH. Then you must go through the door to the NORTH again to location 8. The first time that you played the game, my guess would be that you were killed attempting to move east. This is because of a security beam. To move east you must CRAWL on your hands and knees to location 9. Upon EXAMINEing the CARPET you will find that there are small grooves leading to a filing cabinet. This indicates that perhaps the cabinet has been pushed there. So why not MOVE CABINET? If you do you will reveal a small hole which you can ENTER. There you will find an electronic card. Take it and return to the Bridge. (Enter: TAKE CARD, OUT, CRAWL, SOUTH, SOUTH, WEST, WEST, INSERT CARD)

THAT'S IT

Well that is the end of this month's dose of help. Next time we will be able to start on the more complex puzzles but I thought it best to start this month on the simple ones in case anyone was still struggling. Not everyone will be up to the same position in the adventure and I will take the problems as they arise whilst your playing it. I hope you like this new format of approaching the problems and with a bit of luck we'll meet again next month. Happy adventuring!!

INTRO-LINKER

Brighten up your intro screens

JOHN HARPER

As with most things in life, first impressions count for a lot. When you go to buy a second hand car, if it LOOKS good you are more inclined to forgive the minor mechanical defect. Likewise, when you meet a girl/fella for the first time, you go out of your way to create a good impression. The same must be said of computer programs. If it looks good at the start, you are more likely to forgive the odd bug or two. This utility lets you create those 'good impressions'.

THE POSSIBILITIES

The program allows you to 'LINK' an INTRO, which has been previously edited by you, onto the front of another program. This can be Basic or Machine Code, the only restriction is that it must load to $0801 (2049) and start with a Basic RUN command. The main use or this is for when you have forgotten ro say something in your main program. (The instructions for instance, or perhaps some opening credits). You can now link an INTRO onto it with not one, but two scrolling messages, three lines of static text and a nice logo to finish it all off.

HOW TO USE INTRO-LINKER

1. First of all, load and run INTRO-LINKER or select it from the CDU menu.
2. Type in all of your text as instructed (Having first selected the appropriate option from the main menu).
3. Load your LOGO or drawing (see below).
4. Link to a program of your choice. (maximum length is 194 blocks)
5. Crunch the file. (Start address is $0C00)

CREATING A LOGO

The logo should be drawn on a character editor such as the excellent "ULTIMATE FONT EDITOR", published in CDU - JANUARY 1990. Leave the bottom row of characters blank Make a note of the three colours used and enter them as HEX digits after the logo has loaded On the disk are two logos that I have provided. The colours for these are 'E', '6' and '3' respectively. Remember, to get multicolour characters you have to use the colours 1-8, but they have to have 8 added to them. For example, $6 (BLUE) becomes $E

EDITOR OPTIONS

There are only 5 options from the main editor menu. These are;

F1 -	Type static rext
F3 -	Type scroll text 1
F5 -	Type scroll texi 2
F7 -	Load logo
SPACE -	Link and Save

When typing in your rexl, the '@' is needed to terminate the text. Obviously, you do not have to use all the options in your own INTRO, but the more you use the better it will appear.

INTRO CONTROLS

You can control the INTRO by the use of a joystick in Port 2.

U -	Increase the speed ot the top scroll
D -	Decrease the speed of the top scroll
L -	Increase the speed of the bottom scroll
R -	Decrease the speed of the bottom scroll
SPACE BAR -	Exit the INTRO and run the program

I hope you like this simple, easy to use utility. Have fun!

S.E.U.C.K. WITH MUSIC

Adding music to your S.E.U.C.K. games is easier than you think

DAVID DEWAR

Ever since the C64 was released upon us some years ago, people have dreamed of having power at their finger tips. Power to create various arcade games of their own, without the need to spend ages learning machine code. Numerous so called GAME CREATORS have been released over the years to try and fulfill this creative need for non-programmers. Unfortunately, all these greatly restricted us to have simple, small and repetitive playing areas. Thankfully, to the relief of most of us, the masterful duo that brought us WIZBALL and PARALLAX let loose their talents on a games writing utility known to us all as "THE SHOOT'EM UP CONSTRUCTION KIT" (S.E.U.C.K. for short). This program enabled thousands of C64 enthusiasts to create exciting arcade style games all of their own, with the minimum of effort. Impressive fast scrolling screens, complete with masses of wizzing enemies were now possible with the aid of S.E.U.C.K. Gameplay could easily be varied according to the users own needs and desires. Virtually every type of game could be made. Ranging from a sophisticated shoot'em up through to a souped up version of COMMANDO. The choice was only limited by the users own imagination.

S.E.U.C.K. AND MUSIC

S.E.U.C.K. might well be a great program to use and help show off your game designing skills, but one aspect that it sadly lacks is the option to include music with your finished production. Do not fear, all this can now be changed with the aid of a BACK-UP CARTRIDGE (with a built in RESET BUTTON), some MUSIC, a SMALL DRIVER routine and by reading on!!

GETTING STARTED

From the CDU menu select the program "SEUCK WITH MUSIC". This is a demo giving you more useful information. After viewing this program load the program called 'SEUCK PLAYER'. On running this file you will be presented with a menu showing the available MUSIC which can be used. Press keys 1-6 to select a piece to load and listen to. Once you have decided which piece of music you wish to use, turn the computer OFF, then on again. Now load in your own, or someone elses, finished S.E.U.C.K. game. Reset the computer then load in the previously chosen piece of music, follow this by loading in the file name 'SEUCK.INIT'. Now you can enter SYS28681. A few important instructions will be displayed, all of which should be carefully carried out. Once copying is complete, reset and load in your new improved game and watch those raster bars bounce!!

TAKE NOTE

On some rare occasions you might find that once you've pressed fire to start the game, you find that you're on another level. It does this because when you saved out the finished game from within the S.E.U.C.K. utility, you did not return the level parameter to the beginning. Pressing RESTORE will restart the game to level one. It is still best to go back to the S.E.U.C.K. utility, alter and re-save. The chosen piece of music should not be loaded in from 'SEUCK PLAYER'. All music is played from $7506, so any other music you wish to use must occupy the same part of memory.

FINAL NOTE

I hope you enjoy S.E.U.C.K. games even more now that they have music with them. In the near future I hope to bring you a CRUNCHER that will save out your S.E.U.C.K. games into the smallest file possible. Also, I hope to bring you an INTRO WRITER which will help smarten your S.E.U.C.K. creations by providing a nice iittle intro. A very special thanks must go to MANIACS of NOISE for supplying the brilliant music used in this program. Thank you CHRIS!!

READ ALL ABOUT IT!

▸ Welcome to FSSL's brand new 1991 catalogue featuring what's best in software & hardware for your Commodore 64 & 128. We are introducing several brand new products together with some old favourites which we hope will provide interesting reading for you. So What's new? Well some products we are very proud of are the Handy Scanner + Maverick v5, GeoWorld Issue & Disk 25 and Super Snapshot v5 SlideShow Creator.

You will notice as you look through this essential guide to the 64 and 128 software that after every product is a Catalogue Number. Please quote this when you order and make a note of your Account Number for future reference – this will either be told to you over the telephone when you order or will be printed on your invoice/receipt. You will find our address and telephone numbers on the bottom of this page. Well, we won't keep you any longer. All that's left to say is sit back, relax and enjoy.

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Handy Scanner+

Technology in the last few years has dramatically advanced the power and performance of the Commodore 64 and 128. Who would of predicted that the little 64C and C128 would be able to access hard drives, 16 meg RAM packs and run faster than an IBM XT! But it's true and now one more string to its bow. The Handy Scanner.

What use is The Handy Scanner to me? I here you ask. Well grab your best picture from a magazine, paper or book, how would you get that picture into your computer? Draw it? It would take hours to redraw and unless you're Van Gogh the picture is going to look rough. Don't cut your ear off, use The Handy Scanner, set the resolution, drag the scanner over the picture and before you can say Sunflowers sold for how much? The master piece appears!

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- Enlargement or reduction from 33% to 300%
- Joystick & 1351 Mouse Support.
- 20 fill patterns plus change/re-fill & direction control
- Precise pixel/cursor location continously reported
- Split screen pixel edit with clip rotation & trash features
- Clip & re-arrange any image segment
- Switch between normal & reverse picture
- Powerful text editor with fonts.
- Keyboard short cuts for fast image processing.
- Standard Line, circle, box, spray commands
- Reduce scanned image by 50% decrements
- Graphic memory of 640 x 400 standard
- Automatic input from scanner
- Use Super Snapshot to transfer to PrintShop, BASIC 8 etc.

DPI Handy Scanner Feetures –

- DPI Handy Scanner 3000 PLUS with cable 4.13" (105mm) Scan width.
- 100/200/300/400 switchable DPI resolution.
- Four encoding modes – including Photo, Start Letter & B & W
- Built-in scanner view window for accurate scanner placement.
- Yellow-Green LED scan light
- Visible LED scan to monitor scan speed
- Thirty Two shades of grey
- Brightness control on scanner
- Front and rear tracking rollers
- Dimensions 5.25" (136mm) W by 5.91" (150mm) L by 1.42" (36mm) H.
- Package Weight 2kg Approx

STOP PRESS. Now available, IBM PC/XT Users Pack. Use you handy Scanner on your PC pack includes interface card (with mouse port) Handy Scan PC software plus PC PaintBrush + (worth £150). Worth buying even if you don't own a PC yet! Cat No. 901 only £39.95.

1750 CLONE SERIES RAM PACKS

If you're blown away by the amazing things a Commodore can do with just 64K or 128K, imagine what it could do with 512K! If you'd like to find out first hand, you need a Commodore 1750 RAM Expansion Unit. The only problem is that Commodore 1750's are almost impossible to find! But we've got a simple solution for you.

Our 1750 Clone uses Commodore's own 1764 (256K) REU as a platform to build on. After the installation of an additional 256K, you wind up with an REU that is absolutely indistinguishable from a 1750 to both your hardware and software.

In fact there's only one difference – who would you rather call for support – us or Commodore? Why, thank you.

Don't wind up overdrawn at the memory bank. Step up to half a meg of raw computing power that runs at the speed of RAM. Step up to the 1750 Clone! Cat No. 175 only £169.95

STOP PRESS

The 1750 Clone is now available in a 1 and 2 megabyte version for Commodore 64 and 128 users. Upgrades are available for existing owners, call for details and pricing. The extra memory can be used by GEOS v2 64 and 128 as either one 1581 RAM drive with 1024K free or two 1581 RAM drives with 2048K free. Enough room to store a whole 1581 GEOS disk. Configure 2.1 (included FREE).

Cat No. 903 1 Meg Clone £199.95 • Cat No. 150 2 Meg Clone £299.95

JiffyDOS Version 6

Ultra-fast multi-line serial technology. Enables JiffyDOS to outperform cartridges, Burst ROMs, Turbo ROMs and parallel systems – without any of the disadvantages.

- Speeds up all disk operations. Load, save, format, scratch, validate, access PRG, SEQ, REL, USR files.
- 100% Compatibility Guarantee. Guaranteed to work with all software and hardware.
- Uses no ports or extra cabling. ROMs install internally for speed and compatibility.
- Easy installation. No experience or special tools required for most systems.
- Supports C64, 64C, SX64, C128, C128D, 1541, 1541C, 1541II, 1571, 1581.
- Can be completely switched out. Returns you to a 100% stock configuration.
- Built in DOS wedge. Plus 17 additional commands and convenience features.
- Built-in two drive file copier. Supports all file types and drive types.
- REU support. Fully supports Commodore REU's under RAMDOS.
- Enhanced text screen dump. Auto-recognition of uppercase/graphics and lowercase.
- Redefinable 64-mode function keys. Easily redefine the keys to suit your specific needs.

- Computers: No. 748 64C £34.95 • No. 747 C64 £34.95 • No. 749 C128 £34.95 • No. 952 128D & 1571 £59.95
- Disk Drives: No. 522 Enhancer 2000 £24.95 • No. 948 Oceanic 118 £24.95 • No. 949 1541 £24.95
  No. 950 1541-II £24.95 • No. 951 1541 C £24.95 • No. 953 1571 £24.95

JiffyMON 64

A new high performance Machine Language Monitor designed to work in conjunction with JiffyDOS. JiffyMon is loaded with useful features and can be used without exiting BASIC. It also has a built-in drive monitor for easy access to drive memory. JiffyMon comes complete with a well documented user's manual and offers features just not found in other monitors.

Cat No. 902 only £19.95

SUPER SNAPSHOT v5

Ten Years Of Power In The Palm Of Your Hand.

We know the dilemma you're facing. The basic design of your Commodore was laid out in the late 1970's. You want to be able to take advantage of all the lessons that were learned in the 1980's, but you don't want to sacrifice a machine that you're comfortable with. A machine for which you have spent years creating an extensive software library. A machine that's paid for. Well you could scrap your Commodore and start all over again with a different system to get the benefit of the dramatic improvements created during the last decade. Or you could just plug our cartridge into your computer and instantly transform it into the machine that you've always dreamed about!

Picture turning on your system and being presented with a main menu that allows you to choose from several different command modes instantly. No disks to load. No files to find. Just instant performance from the extended operating system that's built right into our cartridge! Press a function key, and a window opens up and puts the power of several different file management and archival utilities at your command, all instantly accessible at the touch of a finger.

Once the work is done, maybe you'd like to relax with a game. Having problems getting past level 23? Don't worry about it. Just use Super Snapshot to store an image of the game before you get into trouble. Every time you die, just start over from that image—with all your previous lives, levels and inventory intact!

Don't need to use any of our special features right now? OK, just push a button, and you're right back at the old READY prompt! It's the same old computer as before. Except now it will save files about 7 times faster, and it can load files up to 15 times faster!

But none of this really scratches the surface of what a Super Snapshot cartridge can do for your system, and we would run out of room trying to tell you. So do this: read the technical specifications section and then close your eyes and try to picture what you're Commodore would be like if it were designed today. Now you're starting to get the idea.

Technical Specifications -

- All features are availble at the touch of a button.
- Works with all 64's and 128's (in the 64 mode)
- Save 7x faster & load 15x faster on 1541/71/81 drives.
- Turbo 25 utility formats your program files for 25x faster loading!
- Super DOS wedge built right in.
- Programmable function keys
- Exclusive Boot sector support just like 128 owners.
- Exclusive Sprite Monitor on board.
- Full featured scrolling M/L monitor with DriveMon does NOT corrupt memory - interrupt, examine and safely resume any running program!
- Game Master menu with life saving sprite killer infinitive lives generator and joystick port swapper
- Utility disk with over 100 Kracker Jax Parameters.
- Compatible with ALL RAM Expansion Units
- Exclusive Character Set Monitor
- Exclusive Sound Sample Monitor on-board.
- Archive any memory resident program into one file
- 300/1200/2400 baud terminal program (40/80 on 128)
- Screen-Copy load and save in more graphic formats AND dump in 16 grey scales or full COLOUR with the Star LC10
- BASIC Plus with 15 new commands.
- Ultrafast file and disk copiers with support for 1 or 2 drives
- Sequential File Reader

Super SnapShot V5 SlideShow Creator

Powerful options within this package allow you to create slideshows using Snapshotted screens to produce dazzling effects in eye-catching presentations. Options include: fade, shutter, pop and slide on/off. 10 Different fonts to display your personalized, scrolling message - anywhere on the screen! Slideshow can even be incorporated into your BASIC and Machine Language programs.

Cat No. 925 only £8.95

SUPER SNAPSHOT v5

£34.95

Catalogue Number 519

32K RAM Expansion	Cat No. 651 £44.95
8K Disable Switch	Cat No. 926 £4.95
Version 4 Upgrade	Call for details.

Maverick V5

It's Time To Play Our Last, Best Hand ...

The Commodore market is in transition. Newer machines have eclipsed the 8-bit Commodore computer. Some new buyers are going elsewhere. And many companies are shifting loyalties, dropping Commodore products to pursue greener pastures. Not us. We've always been there, pushing the envelope, making your 64 do things it shouldn't do.

As evidence of that fact, we present Maverick v5. For the last two years, we've worked hard to develop and refine maverick. Our thousands of satisfied customers are a testament to how well we've done. We're proud to announce that version 5 is our final version of Maverick. Why? Because we've perfected the program to the very edge of our capabilities. We've made it as good as our skills allow. And while we'll still offer future parameter disks to keep up with new prgrams and protection schemes, there will never be a Maverick v6. We can look you right in the eye and say "This is our best shot - it won't get any better than this."

Copiers developed by other companies are described in rough generalities because they can't elaborate on features they don't have. But take a look at our detailed technical listing and you'll understand how Maverick has become the criterion it is. When you decide to protect our investment in your valuable software, don't settle for anything less than the product that set the standard for an entire industry. The one and only Maverick.

Cat No. 427 Maverick V5 only £29.95
Includes Parameter Modules 1 thru 8
Cat No. 428 V4 to V5 Upgrade £19.95
Cat No. 425 V4 (limited Stocks) £24.95

▶ NEW...

All modules now have directory files and allow fast autobooting with 1541/71/81. They also support slow boot mode for hard drives & other compatible devices. Directories are organized for easy filecopying of modules by end user. REU and 64k Video RAM is auto-sensed and utilized whenever applicable.

▶ Fast Data Copiers...

Single and dual 1541/71 support. Single and dual 1581 support.

▶ NEW...

Single Drive 1571 Double Sided Copier

▶ GCR Nybble Copiers.

Single and dual 1541/71 Support. These are the most powerful software based nybblers on the market.

▶ RAMBOard Nybbler...

Working in conjunction with one or two 1541, 1541 II or 1571 RAMBOards, this copier allows automatic copying of many of the toughest protection schemes on the market.

▶ Sector Map Editor with Data Scanner - Allows high speed error scans and data searches. Supports 1541 and 1571 formats.

▶ Maverick GCR Editor...

A powerful tool for the experienced hacker.

▶ GEOS Parameter Menu...

Up to date parameters to completely deprotect your GEOS library.

▶ NEW Disk Compare Program...

Supports dual 1541/71/81. This utility is the fastest, most full featured compare utility ever created.

▶ REU & 64K VDC Quick Text

▶ Relative File Copier

▶ NEW GEO-BOOT...

Now supports 1541 and 1571 drives as well as the 1581 disk drive. After using this feature, your entire GEOS library becomes file copyable.

▶ Quick File Copier

Supports 1541/71/81 formats - any direction. Includes more features than any other file copier created.

▶ Parameter Menu

Maverick now boasts almost 500 parameters that either copy or completely strip the copy protection.

▶ Directory Editor...

The ultimate tool to organize your library. Supports 1541/71/81 disk drives.

▶ Directory Recovery...

Recover blown 1541 disks. NEW! Works with 1571 and 1581 as well.

▶ Track & Sector Editor...

Supports 1541, 1571, and 1581 disk formats.

▶ RAMBOard Track Editor

The most powerful, whole track editor on the market. Allows macros to copy every track, even if each track requires special settings.

▶ File Track & Sector Tracer

Identify, view and edit any sector in any program file - fast. Supports 1541/71/81 disk formats.

▶ High Speed File Viewer...

Now you can view or print your sequential & program files without loading the application that created them.

▶ GEOS Sector Editor & File Copier

Desktop accessible with mouse support.

▶ 6502 Machine Language Monitor...

Scrolling display includes DriveMon.

RAMDRIVE

HIGH PERFORMANCE BATTERY BACKED RAM DISK CARTRIDGE

- Compatible with a vast amount of commercial software as a high speed RAM based disk drive
- Installable DOS operates up to 20 times faster than Commodore's RAMDOS and provides full Commodore DOS command compatibility
- DOS includes Jiffy DOS Kernal routines for high-speed disk access with Jiffy DOS equipped disk drives
- Software for copying and GEOS compatibility included.
- Power backup eliminates loss of data files upon powering down the computer
- Battery connector included for battery backup
- Reset switch allows computer to be reset while retaining data in the RAM disk
- Disable switch allows the RAM disk to be disabled at any time
- Available in capacities of 512K, 1 Megabyte and 2 Megabytes.
- Compact design housed in a standard cartridge case

RAMDrive is a new approach to RAM expansion for the Commodore 64 and 128 computers. RAMDrive may be used as a stand-alone RAM expander or may be combined with RAMLink for a more flexible RAM disk system. RAMDrive plugs directly into the C64/128 cartridge port and provides a RAM disk drive system which, when used with the supplied DOS is compatible with standard Commodore DOS commands. RAMDrive greatly enhances the capabilities of your system by providing high-speed loading, saving and many other standard DOS functions. The RAMDrive hardware/software interface provide a high degree of compatibility to allow vast amounts of current software to utilize RAM as if it were a disk drive. RAMDrive is power backed to protect the contents of RAM when your computer is switched off or may use battery in place of the power unit to protect data when power failures occur. RAMDrive will also work in conjunction with a REU on a modified Aprospand Bus.

RAMDrive uses RL-DOS to give you the speed you expect from a RAM disk. Unlike Commodore's RAMDOS, RAMDrive is not bogged down by constant memory swaps. RAMLink is a multi-purpose hardware interface designed to overcome the limitations of C64 and C128 RAM expansion units while providing other substantial benefits. RAMLink delivers the performance and compatibility lacking in other RAM products by providing a highly compatible and efficient DOS interface. This interface allows vast amounts of current software to utilize and Commodore REU (1700/1764/1750) GeoRAM. RAMDrive or CMD's RAMCard as if it were a disk drive. RAMLink may also be user-up after the initial setup procedure and does not require the use of any RAM or vectors in the computer. As a result RAMDrive's DOS cannot be accidentally disabled or overwritten by software. RAMDrive's version of RL-DOS also supports all Commodores DOS commands (including block reads and writes), enabling it to be compatible with the many programs that utilize these commands.

RAMDrive, with its extensive DOS and power-backed features, is an obvious choice over any other standard RAM unit available. For those who don't need the extensive capabilities of RAMLink, RAMDrive provides an affordable alternative without sacrificing compatibility or speed. RAMDrive may also be used in combination with RAMLink to battery-back a portion of RAM.

Cat No 955 512k 149.95 • Cat No 956 1 Meg $199.95 • Cat No 957 2 Meg $289.95

▶ Both RAMLink and RAMDrive Include RL-DOS

- Allows vast amounts of commercial software including GEOS, to access all available RAM as a high-performance RAM Disk
- RL-DOS runs 20 times faster than Commodore RAMDOS, up to 400 times faster than a 1541 & provides full DOS command compatibility
- Up to 32 1541/71/81 Emulation/Native partitions plus true subdirectories.
- Includes built in JiffyDOS Kernal for high speed access to JiffyDOS equipped disk drives PLUS Software for copying disks & files.
- Many other features including CMD's device number swap functions

▶ Which One Is Right For You?

Both RAMLink and RAMDrive give you features never before available in a RAM Expander. RAMDrive is intended for users who do not require the high RAM capacity of RAMLink (up to 16 meg) or RAMLink's pass-thru port. RAMDrive is an excellent choice if you want portability since the internal battery pack can keep the contents of RAMDrive intact for several days. RAMLink is perfect for GeoRAM owners as it makes unit useable with programs other than GEOS. No matter which CMD RAM device you select you'll benefit from fantastic capabilities of having a high speed RAMDisk equipped with RL-DOS.

RAMLINK

POWER BACKED REU INTERFACE AND EXPANDABLE RAM DISK

- Allows most commercial software to access your RAM Expansion Unit as a high-performance RAM Disk
- Supports CBM 1700/64/50 GeoRAM & RAMDrive.
- Optional RAMCard allows RAMLink to be used as a RAM disk with or without separate REU
- Built-in RL-DOS runs 20 times faster than Commodore RAMDOS & provides full DOS command compatibility
- Includes Jiffy Dos Kernal routines for high speed disk access with Jiffy Dos equipped disk drives
- Separate power source eliminates RAM data loss when turning off the computer
- Pass-thru connector allows a second cartridge-port peripheral such as a MIDI interface or utility cartridge to be used at the same time as the REU.
- Reset Disable, Direct REU Access Mode switches device number SWAP functions are standard

[illegible] of as a stand-alone RAM expander and provides a parallel interface for the CMD HD series of hard drives. RAMLink plugs directly into the C64/128 cartridge port and provides a special REU port and a pass-thru port for attachment of other types of cartridges. It is also possible to combine the use of RAMCard with any of the other RAM expanders mentioned for a total of up to 16 Megabytes of RAM storage.

RAMLink gives you the speed you expect from a RAM disk. Unlike Commodore's RAMDOS, RAMLink is not bogged down by constant memory swaps. This enables RAMLink to perform up to 20 times faster than RAMDOS, with most types of file access. In addition, RAMLink has built-in Jiffy DOS Kernal routines to provide greatly increased speed and other features when accessing serial drives equipped with Jiffy DOS. RAMLink also provides a parallel port for connection to CMD's HD series Hard Drives, for ultra-fast hard disk access.

RAMLink's specially designed hardware interface combined with a built-in operating system (RL-DOS) give it the ability to work as a RAM disk with almost all commercial software. RAMLink's DOS is active immediately upon power-up (no software to load) and does not require the use of any RAM or vectors in the computer. As a result, RAMLink's DOS cannot be accidentally disabled or overwritten by software. RAMLink also supports all CBM DOS commands (including block reads/writes), enabling it to be compatible with the many programs that utilize these commands.

No. 950 RAMLink Base Unit No RAM $149.95 • No. 961 RAMCard 1 Meg $149.95
No. 959 RAMLink w/ RAMCard 1 Meg $299.95 • No. 962 RAMCard 2 Meg $239.95
No. 960 RAMLink w/ RAMCard 2 Meg $349.95 • No. 963 RAMCard 3 Meg $329.95
No. 966 CMD HD Parallel Cable $17.95 • No 964 1 Meg SIMM Card $74.95
No. 965 Battery backup Unit $24.95 • Larger Capacity Units - Call

GEOS UPDATE

DiskArt

DISKART 13
- International Symbols
- Hobbies/HomeCrafts
- National Flags 1
- National Flags 2
- Mechanical Devices

Cat No 65 only £7.95

DISKART 14
- Commercial Aircraft
- More U.S. Jets
- Military Vehicles 1
- Military Vehicles 2
- Real Sports

Cat No. 66 only £7.95

DISKART 15
- Plants & Flowers
- Trees & Shrubs
- Furniture Silhouettes
- Church Pix 3
- Church Pix 4

Cat No. 67 only £7.95

geoUSER Publications

New from America, geoUSER Publications produce geoJournal the magazine of the geoMETRIX Users Group and The geoUSER Disks collections of all the best Q-Link programs. Each geoMETRIX Journal covers three or four topics in detail and has all the news and reports you would expect in a user group publication. We have not listed the contents of the geoUSER disks only to say that they are double sided and contain a large collection of utilities program, fonts, clip art information documents and much more. Each disk is supplied with the geoMETRIX magazine

geoMETRIX 1
Tailor Your GEOS
RUNs Power Pack
Quick Keys
Cat No 102 only £7.95

geoMETRIX 2
A Hi-HUN for RUN
What's a DeskTop
Bigger Clip Art
Cat No 103 only £7.95

geoMETRIX 3
Rumor Column
Q-Link
New Products
Cat No 104 only £7.95

geoMETRIX 4
Facts on RAM
Choosing A Printer
Big Questions
Cat No 105 only £7.95

geoMETRIX 5
Geobabel Review
GeoPrint Review
Let's Go Faster
GEOS Programming
Cat No 106 only £7.95

geoMETRIX 6
Let's Expand Memory
GeoPaint Toolbox
geoJournal info
Rumour Column
Cat No 107 only £7.95

geoMETRIX 7
The MAC Connection
GEOS Disk Collections
IBM GEOS
Close Up
Cat No. 108 only £7.95

geoMETRIX 8
Printing
Font Mania
Beginners Column
GeoWizard Review
Cat No 109 only £7.95

geoPOWER Tools

geoPower Tools is a collection of some of the best utilities and program available for GEOS. Most programs run on the 64 and 128 in 40 and 80 columns. Instructions where needed are supplied in geoWrite format ready for you to view and print. If you have been impresssed by other utilities collections you will be amazed by this one.

Side 1 Utilities

AUTOBOOT Creator ▸ BASIC 8 2 GeoPaint ▸ Calendar Printer ▸ Geo Dir Ar ▸ Fast Anit ▸ FFTB ▸ Font Converter ▸ GeoFetch ▸ Geol ibraran ▸ GeoPaint Viewer ▸ GeoReplicator ▸ GeoSID ▸ GEOS CO2 ▸ Geo Info ▸ Geo Pixel Puzzler ▸ Inspector Diskette ▸ Phoenix ▸ Programmers Calc ▸ Screen Dump ▸ Shape That Baby

Side 2 Clip Art and Fonts

School & Education ▸ Sports & Recreation ▸ Myth & Fantasy ▸ Animals ▸ Fonts ▸ Camping & Hiking ▸ Seasons ▸ Holidays ▸ Transportation

Cat No 128 geoPOWER Tools **only £19.95**

GEOWORLD ISSUE 25

Just arrived GeoWorld Issue and Disk 25. Topics covered include Sound sampling with GEOS, GeoPublish Setup ideas How to expand your REU to 1 or 2 Meg Extra G O Bach Commands The GEOS Companion, GEOS Gems GEOS News Friendshipware and much more.

Cat No 62 GeoWorld Issue 25 **only £2.95**

Cat No 61 GeoWorld Disk 25 **only £12.95**

GateWay

More than a replacement for the desk top, the GateWay offers a unique streamlined approach to file management under GEOS. With a resizable Note Pad, proportional slider and fuel gauge, the GateWay makes it easier to get where you are going.

Here at CMD we took a good hard look at the desk top, then decided to create the GateWay. As a result, all the functionality of the desk top can be found in the GateWay. But we weren't content to stop there. We added feature after feature– features that you, the serious GEOS user have found lacking in the desk top.

▸ Better Drive Support.

Full three drive support with auto swapping for those applications which recognize only two drives. Imagine launching your favourite application from drive C! Copying to and from drive C without swapping drives! Drive C the way the desk top should have handled it!

▸ Disk Drives.

Users without RAM expansion – trash CONFIGURE because the GateWay allows you to integrate your device drivers directly into the GateWay itself. Not only will you save disk space but you'll never have to worry whether there's a CONFIGURE on that work disk again. In fact, everybody trash CONFIGURE because the integrated Control Panel does it all. We've implemented the DISK DRIVER now rather than wasting disk space on drivers you don't need, simply copy the drivers you do require onto your boot disk and that's it. The Control Panel will automatically determine which drives are on your system & mount them.

▸ Easy Disk Identification.

The GateWay also allows you to individually define disk icons. Getting tired of that old 5.25 in drive icon? With the GateWay you can define your own. Just select set disk icon from the special menu and the drive's icon becomes that of the currently selected file! The GateWay remembers – insert that disk later & the GateWay will display the icon you chose earlier.

▸ Full CMD Device Support.

For CMD HD hard drives, RAMLink and RAMDrive owners the GateWay allows full access to these devices. Need access to 16 Mb of online storage a subdirectory or a partition? Do it quickly and easily with the GateWay.

▸ An Integrated Control Panel.

Choose your colours, GateWay pattern, input and printer drivers, set the time or configure your drives. All from within the control panel–always available because its part of the GateWay. The Control Panel includes a Chooser for selecting printer the desk top, the GateWay offers a unique, streamlined approach to file management under GEOS. With a resizable Note Pad, proportional slider and fuel guage the GateWay makes it easier to get where you are going.

Here at CMD we took a good hard look at the desk top, then decided to create the GateWay. As a result, all the functionality of the desk top can be found in the GateWay. But we weren't content to stop there. We added feature after feature – features that you the serious GEOS user, have found lacwith the GateWay it's all possible.

▸ Task Switching.

Do you use RAM expansion? Then you can access multiple tasks with GEOS. Our new switcher (a GateWay document) allows two separate tasks to run concurrently. Imagine having GEOWRITE and GEOPAINT running at the same time. Imagine the ease with which you could paste graphics and text scraps between them. Only with the GateWay – a new intergrated way of working with GEOS.

▸ PLUS A LOT MORE...

Features like the fuel gauge to indicate speed and available disk space. And a proportional slider gadget for moving quickly through the directory. Convenient Status to indicate current copy or delete status and brand new disk and file info boxes. Plus a file locating browse feature, preprogammed redifinable function keys, RAM rebooting and new Trash Can mechanism. Yes at CMD there is a lot more going on than powerful hardware development we're creating software tools to use it! Both GEOS 64 & 128 versions supplied in one package.

GateWay
Cat No 127 **only £39.95**

USA DIRECT

American Import Software For Your Commodore

▸ Mavis Beacon Teaches Typing

Forget the simple letter drills when was the last time anyone typed 'asdfjkl;sa' at work? Using a combination of artificial intelligence and striking graphics this program teaches typing faster than any program on the market. Each lesson is tailored for work in the real world from a database of over 1,000 passages from history's greatest writings. For youngsters, Mavis offers jokes, riddles rhymes, interesting facts and records from the Guiness Book of World Records. Mavis 'speaks' to her students in complete conversational sentences as she analyses typing errors and progress – with more than just 'bleeps' when an incorrect key is hit. She even senses when the student is tired and suggests a break at the Indy Racer Game!

Many other features are included in this outstanding typing tutor such as a metronome selection. Dvorak keyboard option a resume writer userdesigned lessons, and suggestions for business teachers developing their own lessons. Cat No. 970 £39.95

▸ Paperclip Publisher

Create newsletters, price lists, menus greetings cards resumes, brochures and anything that uses words and pictures. Import and edit pictures from a variety of graphics programs like Outrageous Pages Doodle and Newsroom among others and even touch them up with the built-on Graphics Editor. Cat No. 971 £39.95

▸ Doodle

Fast, easy and fun! Doodle turns your computer into a tool for unlimited design and artistic creativity! Create anything you can imagine... from sketches to house plans to fine art to business forms or letterheads that you can run off on your printer! Precise mouse or joystick operation, high resolution graphics, program flexibility, and super ease of use. Special functions include duplicate rotate squeeze, reduce enlarge stretch and reposition. 'Letter' commands let you put the keyboard text and graphics characters on the screen in any size and direction. Doodle prints copies at the touch of a key – works with most popular printers including the Okimate 10 colour printer. Cat No. 972 £24.95

▸ The Personal Accountant

Anyone, even without any accounting background can manage their finances and produce professional reports. The Personal Accountant is fast and easy – you can enter whole months transactions in just minutes. Entries can be made in five catagories of accounts – Income Expense Deposit, Loan and Equity. The program automatically posts the the 'second' account in the transaction. Includes Loan Calculator and Name/Address Book programs. Reports include Trial Balance, Net Worth, Profit and Expense. Cat No. 979 £29.95

▸ Create A Calendar

Epyx introduces a fun and easy way to organise your hectic schedule by making your own totally unique calendar. Make up weekly chore lists or VCR taping schedules. Keep track of homework assignments. Combine text and graphics to create daily weekly monthly or annual calendars. Repeat regular events automatically like a Boy Scout meeting on the third Monday of each month place multiple events on a single day without retyping. Fill in holidays automatically and more. Customise your calendars by selecting from a wide variety of fonts borders and graphics to give each one a personal touch. Cat No. 975 £24.95

▸ Paper Clip 3

All new with a built in 40,000 word spelling dictionary outliner and RAM disk support. The perfect program for your home, business or school. Features more formatting and editing functions, compatible with all previous PaperClip versions, and for the C128–mode a special 80 column screen, fast file handling & much more. Cat No. 974 £39.95

▸ Assembler 64

Everything the experienced Assembly Language programmer needs to create assemble load and execute 6500 Series Assembly Language on the Commodore 64. Package includes a powerful microassembler editor, loaders two machine language monitors, and various support routines. The manual details how to create and edit and Assembly Language source file load and support program or wedge maintain the disk load & run programs assemble, test & debug programs. Cat No. 973 £9.95

▸ Typing Tutor IV

Computer productivity depends on typing skill and speed and Typing Tutor IV is an ideal coach! Choose the alphabet keys drill or the number keys drill, set your threshold level and go to work! Typing Tutor IV reports your raw speed in words per minute, number of errors and corrected speed. Then it creates custom-designed lessons. Cat No. 991 £24.95

▸ Start-Up Helper

Smart Start. Sound, graphics and other advanced features make the Commodore 64 as popular as it is. These features can require a lot more programming know-how than many Commodore owners care to learn. SMART START harnesses the power of Commodore and puts it conveniently at your fingertips. Features allow you to Quickly select all options from pull-down menus with cursor or joystick.

Customise your computers border text and background colours. Keep track of time with an on-screen digital clock and alarm. LOAD, RUN SAVE and CATALOGUE programs simply by pressing the cursor and RETURN. Easily create exciting and unique sound-effects. Makes the Commodore fun and easy to use for everyone. Cat No. 976 £12.95

▸ Business Card Maker

Create custom-designed business cards for yourself and for others. With Business Card Maker you can easily print unique business cards specifically geared to any business. Use pull down menus 100 common graphics and several font packages for an unlimited selection of designs. Compatible with Epson printers, Laser printers, and colour printers. Package includes quality 2-across business card stock ready for your tractor feed printer. Cat No. 978 £19.95

▸ HOMEBASE

This simple fast and powerful file management/information retrieval system can be used to store any kind of information that might be found in filing cabinets folders card-files, or buried deep in your desk drawers. You can store up to 700 records per file and define up to 15 fields with up to 80 characters each. There are four rapid searches to locate your information plus calculated field ability and numerical or alphabetical sorting capabilities. Program comes complete with sample files sample reports and a full 23 minute tutorial. Cat No. 977 £19.95

▸ PERSONAL NEWSLETTER

Use your Commodore as your personal desktop publishing centre. Produce great page print-outs with a variety of font sizes and styles digitized pictures and clip art files. In three short steps you can turn out super looking documents for business presentations school reports, plus more. First choose the page style and set-up. Decide the number of columns you want, the placement of the boxes for pictures and the border designs. Then enter your text with the sophsticated word processor (which features editing, moving cutting and pasting).

Finally Personal Newsletter lets you design your own graphics or choose from the many pictures available on the clip art disk provided. You also have the opportunity to import graphics from the other popular painting and graphics programs allowing you to access hunderds of ready-made images. Requires GEOS. Cat No. 996 £22.95

PD SOFTWARE

only 95p a disk!

- ▸ Disk 001 Utilities – Disk backup & Printer utilities — Cat No. 981
- ▸ Disk 019 Games – Monopoly Modem Games Blackjack — Cat No. 982
- ▸ Disk 024 Games – Galactic Zone 64 Librarian, High Risk — Cat No. 983
- ▸ Disk 036 Games – Pool Crypt, Q-Quest, Blue Thunder — Cat No. 984
- ▸ Disk 037 Programs – Banner 64 Finance Label Maker — Cat No. 985
- ▸ Disk 133 Business – Form Maker Data Organizer, Labeler — Cat No. 986
- ▸ Disk 134 Business – Wordmaster Budgeter, Calendar Tax — Cat No. 987
- ▸ Disk 135 Programs – LetterMaker Investments Cash Flow — Cat No. 988
- ▸ Disk 136 Utilities – Disk Wizard, FCopy Supersorter — Cat No. 989
- ▸ Disk 145 Utilities – SuperMon, Term. Squeezer Compiler — Cat No. 990

▸ PD Pack 1

A four disk pack with 100's of Public Domain HAM Radio and releated utility software

Cat No. 992 £7.95

▸ PD Pack 2

Four more disks of HAM Radio Public Domain software for the 64 & 128

Cat No. 993 £7.95

SUPERCAT

Don't Let Your Fingers Do The Walking

Are you getting tired of making you finger flip through dozens (or even hundreds) of disk every time you need to find a particular program? Of course you are! If you've got a large disk library that's not catalogued it's a lot like owning a phone book that's not listed alphabetically. Good luck.

If your fingers are getting frayed at the ends we've got a simple solution for you SuperCat. SuperCat can catalogue up to 640 disks – and up to 5000 titles – on a single drive system. Twice that with two drives. SuperCat is the largest capacity catalogue system available, yet it is packed with features that allow you to interact with it easily and by using ultrafast machine language routines SuperCat can search for and locate any specific title in less than 10 seconds flat! Want to know more?

If you need to keep track of a large software library don't make your fingers do the walking and don't beat you head against the wall. Just go ahead and use SuperCat, the very best tool made for the job. A program you can't find won't do you a bit of good.

- Two drive systems can provide sorted directory of 10 000 titles!
- Accepts titles from disks & duplicate ID's!
- Prints a large variety of lists and reports!
- Sort 1000 titles in just 8 seconds!
- SuperCat works on the C64 and supports most disk drives. Complete printer support.

SUPERCAT
Cat No. 904 **only £24.95**

The Graphic Label Wizard

the number one cure for boring labels

Do you ever print mailing labels for yourself, your business, your spouse or your friends? You do? Well why settle for an ordinary plain text label when you can easily create a unique, distinctive label guaranteed to stand out in a crowd? The Graphic Label Wizard makes plain text labels a thing of the past, now you can easily combine text and graphics to create a one of a kind label you can be proud of. What graphics can you use? Glad you asked. The Graphic Label Wizard will import clip art from Print Shop, Print Master & Print Master Plus and all of the Graphic Art Disks found elsewhere in this catalogue. This means that you can select from hundreds and hundreds of available images. You are sure to find images that are perfect for your application! But that's just the beginning of what this versatile utility can do for you. Take a look at some of these features:

- Print a graphic and up to 8 lines of text on a standard mailing label! Flexible, prints labels 1, 2, 3 or even 4 across.
- Our Hi-Res Preview function allows you to load and view up to four different graphics at the same time – even if they are stored on four different disks!
- You can save your custom labels to disk for later use or modification!
- Special feature prints Mini-Gallery pages for your PrintShop, PrintMaster or Graphic Art Disks graphics – 28 per page plus user defined title!

Come on, stop cranking out plain, dull labels. Have some fun! Make an impression! Live a little! All you need is a little imagination – and The Graphic Label Wizard! Order now and get 150 hi-res graphics FREE. What more could you want? Cat No. 905 only £17.95

MAE 64

A Professional Assembler

MAE64 Macro Assembler/Editor is a fully professional 6502/65C02 macro assembler with a powerful co-resident screen editor for entering and editing your source code. Advanced features in addition to macro capability are included like conditional assembly, interactive assembly, thorough error-checking and many psuedo-ops. We without reservation consider MAE64 to be the best available assembler for developing interface board programs in the 6502 assembly language. Although MAE64 is presently available for the C64 only (or the C64 mode in the C128) it easily can be used to write assembly language programs for the C128 native mode since the form of an object file written to disk is the same for both computers.

One thing which sets MAE64 well apart from other C64 assemblers is its extreme versatility in terms of memory management. MAE64, your source code, the object code resulting from assembly, a machine language tasling your code, and a Basic program which calls your machine language subroutines can all easily be resident in memory at the same time, subject only to the limitation of available memory. This provides an extremely convenient environment for rapid development of moderate sized progams. MAE64 can be freely exited and entered. It is not copy protected and does not take control of your computer away from you. Includes an 89 page manual. Cat No. 906 £39.95

PTD 6510

super powerful symbolic debugger

PTD6510 Symbolic Debugger for the C64 is an extremely powerful tool for testing and debugging your assembly language programs. Has capabilities far beyond an ordinary machine languge monitor. There is nothing else like it for the C64. It's features are far too numerous and powerful to even begin discussing here, but here is a brief description of some.

Watch windows allow you to observe variable locations by single stepping (walking). Automatic high speed steping under control of a "driver" progam you write in the PTD's own compiled language while testing for a condition. Show command gives you the previous 128 instructions executed under the debugger. Supports two entirely seperate screens which flip back and forth. The debuggar screen does not interfere with the screen generated by your program, a two pass symbolic mini-assembler allows creation of "patches" to your program. Includes a 100 page manual. Cat No. 907 only £49.95

SYMBOL MASTER

Our Symbol Master Multi-Pass Symbolic Disassembler is a tool to help you become a better programmer by studying 6502 assembly language programs written by others. It also allows you to adapt existing programs to your needs. As a symbolic disassembler it shows you exactly what instructions are referenced by other instructions. Subroutine entry points, branch targets, and JMP targets stand right out. Automatically generates labels including the actual names of Kernal routines and variables. Generates formatted out put to screen and printer and also writes source code files to disk fully compatible with each of the seven different assemblers MAE, PAL, Develop-64, Commodore MADS, LADS, Merlin 64, Merlin 128 and Panther. 100% machine codes for speed, and not copy protected.

Symbol Master has been very favourable reviewed in Computer Shopper magazine April 1987 page 123. Ted Drude writes, "For casual perusal of commercial software, extended software analysis or just hacking around, I don't think it has many equals in the Commodore world. In fact Symbol Master is of the quality and type of product seen more often in the MSDOS or CP/M world but at a much higher price." Includes program disk and a 63 page manual. Both C64 and C128 versions are included on the same disk.

Cat No. 908 only £49.95

Commodore Service Manuals

[illegible]

[illegible] Service Manual includes [illegible] test diagnostics [illegible]

[illegible] time to safeguard [illegible] investment [illegible] Commodore equipment [illegible] Service Ma[illegible] today w[illegible] repa[illegible] equipment [illegible] future! Available for –

NOW AVAILABLE

USER GUIDES, SPARES, IC'S, CIRCUIT BOARDS, SERVICE MANUALS, TEST EQUIPMENT, UPGRADE ROMS AND MUCH MORE – CALL

Cat No 918 C[illegible] • [illegible]e C64 £19.95 • Cat No 919 Commodore 64C £19.95 • Cat No 92[illegible] • [illegible]modore 128 £34.95
Cat No 921 154[illegible] [illegible] £17.95 • Cat No 922 1541C [illegible] £19.95 • Cat No 1571 only £19.95 • Cat No 924 158 [illegible] £19.95
Call for prices and a[illegible]ability of Service Manuals & [illegible]ers Guides on Monitors, Printers & Pet Equipment

Commodore Drive Repair Videos

Picture this you give a qualified repair technician 29.95 and he comes to your house and teaches you to repair and maintain your own Commodore disk drive.

He comes over at your convenience and he brings his own equipment, including hardware, software supplies, and even several drives to illustrate different problems. In a clear concise manner he shares years of expert knowledge with you as he teaches you everything you'd ever want to know about working on your disk drive using simple tools and comman sense.

When he's done, he agrees to come back any time you want and review any or all of the information he's just given you. And all of that takes place for that one charge of 29.95!

Sound too good to be true? Well, you're right it is. But we've got something so close to the scene discribed above you'd have a hard time telling the difference.

The skills you'll learn from either of these videos will enable you to save the cost of repairs and maintenance service on your 1541 or 1571 disk drive. And the first time you employ your newly aquired skills you'll probably save more than the cost of this tape. But be careful- if word gets around that you've become a drive expert you could find yourself with alot of new friends with broken drives!

- A Commodore service facility named Computer Restore has begun to produce a series of 'Expert Tutorials' on VCR tape. The first of these tapes deal with Commodore disk drive repair. Done in an informal style these videos will take you step by step through many areas.
- Common problems logic board, power supplies, foreign objects in the drive more.
- Tools and techniques to disassemble and reassemble repair and maintain your drive.
- How to identify which component is at fault.
- How to adjust drive speed and head alignment.
- How to troubleshoot and repair the logic board.
- How to prevent problems with preventative maintenance.

Commodore 1541 Disk Drive Video Cat No. 916 only £17.95
Commodore 1571 Disk Drive Video Cat No 917 only £19.95

1541/71 64 & 128
Drive Alignment

Drive alignment problems? Scrapping sounds? May be your disk drive is suffering from bad head alignment and needs to be aligned. Free Spirit's Alignment system is the best and is simple to use, doesn't require any special tools (only a sledge hammer when it all goes wrong!) or expert knowledge, just about half an hour to dismantle align and assemble the drive. The software which works on the Commodore 64 64C C128 and both the desktop and portable 128D (in both 40 and 80 columns) has on screen help which is available for each stage at the press of a key. There are no charts or graphs to study as the alignment condition is automatically checked and reported, many times a second, statements like Needs Alignment, Satisfactory Poor and Bad are used, some good old english words. After you have rotated that old stepper motor you can test the Head Stop (drop the drive off the edge of a cliff) and Speed Test (tow drive behind car for three miles). But seriously the manual is simple & the software loads when nothing else will. Includes Quite Drive Stops FREE! Cat No. 437 only £24.95

64 doctor

A professional diagnostic CARTRIDGE for your C64. Comprises of the 64 Doctor Cartridge User & Serial Port testers and a FREE Comprehensive Fault Diagnostic & Repair Guide. 64 Doctor tests -

- Keyboard Serial Port
- Video Banks
- User Port
- Cassette Key Press
- Cartridge Port
- NMI & IRQ interrupts
- BASIC ROM
- Joystick Test
- Kernal ROM
- Cassette Data
- CIA Chips
- Works on the 128 as well!
- Video Chip
- Joystick Port
- Sound Chip

As long as the screen is displayed simply plug in the 64 Doctor and within a few seconds the status of all the major components are reported along with their loaction. Commodore part number and status. All faulty components are highlighted ready for you to repair your computer yourself or tell your dealer whats wrong and were. Cat No. 438 only £24.95

SLIMLINE CASE

Make Your older C64 look like a new one. All you need is a screwdriver and about 15 minutes to transfer your C64 insides to its new case. No soldering, no special tools needed. New low profile case makes typing easier too because it is sloped down towards the user. Provision is also made for a reset switch and kernal/ROM extension switch to be mounded.

The Slimline case is the same colour as all new Commodore peripherals. Includes concise fitting instructions.

Cat No. 474 Best Seller £12.95

Monitor TEST

This low cost software package allows you to test the video display on your computer and monitor or television. A series of different screens are sent to the monitor each testing a different picture, as you fine tune the display allowing it to be set properly. If a fault is suspected Monitor Test will locate with you. Full on screen prompts. Cat No. 436 £3.95

The Label Maker Version 2

A Professional Label Factory For Your Commodore

Label Maker V2 is designed specifically for making labels but easier to use and more powerful than any database or word processor. Pre-designed layouts (the full tutti text "live area" is displayed on screen) for 11 different types. Create layouts of your own design. Use the font and colour capabilities of your printer or interface such as Expanded. Underline, Letter Quality, Enhanced, Italic, Superscript, Subscript and more. Label Maker V2 interfaces with most popular database and word processors including Superbase, Pocket Filer, Easy Script, Data Manager, or any word processor or database that can create a sequential file with lines ending in return characters. You can use upto 9 database fields and each can be adjusted and printed with right, left or center justification. Both Commodore 64 and 128 (40 & 80 column) versions included.

- Standard Labels
- Hand Fed Envelopes
- Name Badges
- 3 1/2" Micro Disk Labels
- Audio Cassette Labels
- Video Cassette Labels
- File Folder Labels
- Continous Envelopes.
- 5 1/4" Floppy Disk Labels
- Rotary File Cards
- Shipping Labels.
- Design Your Own (up to 15 by 64).

- ✓ Memory Resident.
- ✓ Video Cassette Labels (VHS).
- ✓ Continuous Envelopes
- ✓ Scrolling Selection Windows
- ✓ Insert Mode, Caplock Mode.
- ✓ Print Label From Screen.
- ✓ Print To Disk File.
- ✓ Predefined Labels.
- ✓ Save New Layouts
- ✓ Entry Windows
- ✓ 1 To 12 labels Across.
- ✓ Multi-Print Labels
- ✓ Define Printer Offset.
- ✓ Stop/Start Printing
- ✓ Undo, Cut, Copy, Paste
- ✓ Drop Down Menus
- ✓ Create New Layouts
- ✓ Envelopes Return Address.
- ✓ Increment Field.
- ✓ Fast Machine Language
- ✓ Left/Center/Right Justifing.
- ✓ Single Envelopes.
- ✓ 2 Printer Ports Supported.
- ✓ 9 Fill Fields.

Label Maker V2
Cat No 389

only £19.95

VIDEO CASSETTE LIBRARY

Does it sometimes take you longer to find a tape than watch it? Home video casette libraries are becoming larger and larger. With Video Cassette Library you can bring and then keep everything under control and print professional looking labels. Sorting by Title or any of the nine fields takes only seconds. Information saved includesd: Tape number, Title, Subject/Type, Counter, Length, Rating & three user defined fields.

This unique program features drop down menus, easy to use entry windows, quick sorting on any field, plus you view up to 15 records at a time. Scrolling is fast, all records are in memory for fast access, fast sorts. Import and export functions, prints lists, rotary index cards, standard labels or our own specially designed Video Cassette Labels. You can also use your label designs created with Label Maker v2 (including printer fonts and colours). You can elect to print one record at a time, pick and choose for exporting or printing, or print the entire list – you have complete control. Features –

☆ Memory resident for fast sorts, fast access
☆ Supports label designs created with Label Maker
☆ Easily transfer records between video lists
☆ Contains a Sample List for easy practice.

Video Cassette Library works on the 64 & 128 in 40 & 80 columns.

Video Cassette Library
Cat No 909

only £22.95

MAIL LIST MANAGER

This is the first and only commercial 64/128 program designed specifically to manage your mailing lists. This unique program features drop down menus, easy to use entry windows, quick sorting on any field, view up to 15 records at a time. When the program is loaded, you are given the option of standard U.S. or International addressing, using the post office specifications ie post codes.

With nine pre-designed fields including two or three user defined, no set up time is required. Scrolling is fast, all records are in memory for fast access, fast sorts. Import and export functions print labels, index cards and name badges. You can use designs created by Label Maker version 2 including printer fonts and colour! You can elect to print one record at a time, pick and choose for exporting or printing, or print the entire list – you have complete control. Features –

☆ Unique select before printing and exporting
☆ Fast Mail List load and save times
☆ Insert mode and true caplock mode
☆ Find any record in less than a second.
☆ Supports up to 4 disk drives and 2 printers.
☆ 300 Records for 64, 1000 records for 128 per list.

Mail List Manager runs on the 64 & 128 in 40 & 80 columns.

Mail List Manager
Cat No. 910

only £22.95

BANNER MACHINE 64

A professional flexible banner making machine. Banner Machine allows you to enter and store to disk message & graphics for each banner, when you have stored all the messages simply let Banner Machine automatically print them one after the other all night and all day. Why not set up in business printing banners?

Use Banner Machine to print banners for parties, weddings, special occasions, sales, shows, school an club events, church displays or what ever needs a bit of style.

Your signs can be any length and use 8 sizes of letters (from 3/4" to 6 1/2") in Standard, Compressed or Emphasized character set of the fourteen fonts included. You can also use one of the 8 borders, 15 backgrounds or special graphics. Special Graphics include: Fireplace, Hearts, Ship, Balloon, Wedding Bells, Cross, Heart, Shamrock, Trumpet, Musical Notes, Four Leaf Clover, Stork and many more.

Order now and we will include a 40ft Banner Roll while stocks last absolutly FREE! Cat No. 911 only £22.95

Bible Search

Bible Search contains an exhaustive English Concordance which indexes EVERY word in EVERY verse, thus eliminating any fruitless search of text. The complete verse usage of any word in any of the sections is returned in five seconds or less on a standard C64/1541 (Even faster times for C128/1571 users.) With Bible Search users can perform single or multiple word searches and then display the full text of those verses where the word(s) are used together or seperately. Search options includes pattern matching, AND, OR and NOT operators.

Bible Search Is Fast, Compact And Easy To Use.

The text is complete with: Book, chapter and verse markings, upper and lower case characters, full punctuation, Italics and the words of Christ in colour (KJV). Includes automatic spell-checking with over 12,800 words. Display colours and drive usage are configurable. Works with one or more drives. Printer and disk output is available for any verse(s). NOTE: 'Text Output' to disk produces standard sequential files for use with most word processing programs. two drives are recommended.

The Complete KJV Old and New Testament Bible Search – King James Version, New Testament. Cat No. 912 £59.95

PRINTSHOP

The PrintShop 64 V2

▸ Setup Your Own Printing Shop With PrintShop

There are over one million happy PrintShop users world wide busily creating their personalized greeting cards posters and banners You have probably seen greeting cards and banners at computer shows created using the PrintShop The PrintShop lets you make fun personalized greeting cards for friends and relatives class mates or your sweetheart You can design your own outrageous party banners personal stationary or create posters and flyers for promoting your event! To use PrintShop you donot need to ba an artist, just follow the screen prompts, the large size manual has a clear layout which is perfect for younger users You'll choose from dozens of ready made clip art pictures and borders and fancy fonts

The PrintShop even comes with colourful yellow printfeed paper and envelopes, so you can instantly begin printing your cards posters and stationery

Cat No 385 The PrintShop 64 only £39 95

The Official PrintShop Organizer

▸ A Smart Binder For All Your PrintShop Bits And Pieces

Get organized. Keep all your PrintShop valuables in one easy to carry system. This custom ring binder has a place for each and every PrintShop accessory and its documentation. It holds your system disks clip art disks and reference cards. In addition, The PrintShop Organizer includes a special graphics index just go to the index and it will quickly tell you precisely where to find (which disk and side) the graphic you need.

The PrintShop Organizer is a distinctive yellow and black three ring binder with four anti-static vinly pockets each holds 2 disks an exclusive graphics index for speedy retrieval of the exact graphic you need along with a master listing cross reference by subject and indexed alphabetically by graphic title Plus 5 tab sections for PrintShop, Companion, Graphics & Art disks

Cat No 386 The PrintShop Organizer only £14 95

The PrintShop Companion

▸ An Essential Addon For Your PrintShop

A must for every serious PrintShop user The Companion brings extra features and power to PrintShop It opens up vast new area of creativity and gives you more professional results than ever before. The Companion features brand new fonts dozens of creative new borders, a custom calander maker a font editor and a very powerful graphic editor Best of all, the Companion has a specially enhanced graphic editor incorporating many drawing commands including flip, mirror & invert. A new Tile Magic program turns simple patterns into a work of art Import graphics from other popular drawing packages and make your own characters with the new creature maker

Cat No 670 The PrintShop Companion only £29 95

The PrintShop HandBook

▸ Get More Out Of Your PrintShop

The PrintShop Handbook is a new invaluable source book of ideas, guides, suggestions and hints. Hundreds of ideas with easy-to-follow step-by-step instructions allowing you to copy or adapt an idea, all in a matter of minutes! It is designed to help you get more power whenever you sit down to use PrintShop. The Handbook includes more than 100 original designs for home school and business New ideas for the four basic PrintShop applications, signs, cards, banners and letterheads, with different looks and styles for different purposes. More than 20 new applications including business cards, ads flyers, wrapping paper games & tickets New techniques for mixing graphics & fonts.

Prepared with Broderbund Software, publishers of The PrintShop this book is sure to inspire every PrintShop owner to find more new and innovative uses for the Software Published by Bantam books, 300 large pages

Cat No. 388 The Official Handbook £16 95

Graphics Expander Vol 1

▸ Expand The Creativity of The PrintShop

When those banners, cards, signs and letterheads need a fresh new look, got to Graphics Expander for the snappiest graphics ever You get over 300 exciting new graphics packed with personality Powerful drawing ands editing tools let you combine and modify graphics or create original art

Cat No 387 Graphics Expander Vol 1 £29 95

Coloured Paper Packs

▸ Coloured paper and envelopes are now available in various quantites and budget value packs – call for pricing and availability

TOPSHOP Products

Graphic Products For Today's Software

▸ To mark the second year of TopShop Products (USA) being in business TopShop Products are proud to announce a price cut in its complete range of new Clip Art, Font and Border collections for PrintShop And that includes Budget disks

Below is listed the main themes covered by each disk. The average contents of each Clip Art Collection is one hundred. All disks are Side A PrintShop disks for side B and other popular formats see opposite

▸ Clip Art Collections

Desk 152 Company Logos	Desk 153 Transport	Desk 154 Cartoon Characters	Desk 155 Employment Medicine
Desk 156 Flies, Clocks, Work	Desk 157 Money Stationery	Desk 158 Stars, Foods General	Desk 159 Cards, Awards, Chess
Desk 160 Music, Instruments	Desk 161 Party Burgers, Picnics	Desk 167 Pub, Harvest, Food	Desk 163 Vegetables, Flowers
Desk 164 Large Letters	Desk 165 The Sea, Boats, Fish	Desk 166 Commodore Hardware	Desk 168 Petrol Station Logos
Desk 185 US Team Logos	Desk 186 Football Team Logos	Desk 187 Designs, School Books	Desk 188 General
Desk 189 Funny Characters	Desk 190 Clubs stuff Occasions	Desk 191 Garfields	Desk 192 Football Club Helmets
Desk 204 Faces Of All Types	Desk 205 Naval Flags	Desk 207 General Art	Desk 208 Parties, Patterns
Desk 209 Aircraft	Desk 221 Bears, Monsters	Desk 222 Cats, Animals, People	Desk 223 Computers, Labels
Desk 224 Money, More Garfields	Desk 225 More Garfields	Desk 226 Dancing, Animals, Sport	Desk 234 Beware, Trains
Desk 309 Animals Medicine	Desk 310 Female Faces, History	Desk 311 Cars, Aircraft Boats	Desk 312 Birds, Fish & Cats
Desk 313 Mathematics	Desk 314 Animals in Pose	Desk 315 Science	Desk 316 Flags Of The World
Desk 317 Signs, Machines	Desk 318 Creatures & Faces	Desk 319 Puzzle, Playing, Sport	Desk 320 Halloween, Large Text

NOW ONLY £7.95 Each

▸ Budget Clip Art Collections

Desk 1 Vampires, Happiness	Desk 2 Men, Eyes, General	Desk 3 Diamonds, Cats, Sport	Desk 4 Computers, Fish, Horses
Desk 5 Television Characters	Desk 6 Transport, Space, Tanks	Desk 7 Animals	Desk 8 Animals
Desk 13 Wild West, Indians	Desk 17 People, Garfields	Desk 18 Patterns, Dangar, Faces	Desk 21 Symbols, Old English
Desk 22 64 Computing Stuff	Desk 23 The Armed Forces	Desk 27 US Helmets	Desk 28 Junk!
Desk 29 Corporate Logos	Desk 30 Seasons, Snowflakes	Desk 31 Lets Party	Desk 33 General

NOW ONLY £2.95 Each

The Utility Collection

Two complete collections of utilities in one for your PrintShop, produced in America by Cut Paper Software and marketed in England by TopShop Products.

▸ The Converter Collection

The Converter Collection is a collection of PrintShop converting programs. Transfer Clip Art from PrintShop to other graphic formats. Most converters allow both selective and whole disk converting and support two drives. For 128 users a special high speed 80 column mode converter is included.

With The Converter Collection you can use Clip Art from PrintShop in GEOS Doodle, Flexidraw Printmaster Newsroom, Award Maker, Graphic Label Maker and many others.

▸ The Printer Collection

Over 10 exclusive printer utilities to enhance your PrintShop, Graphic Label Maker – Print labels with upto eight lines of text in different styles of text with a Clip Art graphic

Clip Art Cataloger - Printout all your clip art, a whole disk at a time ten graphics per line with file names

And if all that isn't enough we'll include a new PrintShop Font, a couple of Borders and some Clip Art pictures – quite a deal!

Cat No 384 The Utility Collection **£19.95**

MEGA
graphics bundle pack

▸ PHOTO FINISH

Printout Your Pictures At 640 x 400!

Optimize your Hi-Res graphics producing Hardcopy with Four Times the resolution of standard printer dumps. No more ragged edges say good bye to bumpy circles and forget dotty printouts. This quality is called – Near Laser Quality

No sales hype, printout one of your masterpieces and notice how circles are made up of small rectangles. We'll Photo Finish smoothed into solid lines, giving your picture a professional result.

Photo Finish is compatible with the vast majority of commercial graphic packages. Including geoPaint and with every Photo Finish we'll include Graphic Link a tool created specially for converting those odd formats into a format that Photo Finish and others can use.

▸ BILLBOARD MAKER

Enlarges Your Printout To 4 Feet By 3 Feet!

- Dump shaded standard and enlarged graphic pictures to your printer quickly & easily
- Overlay specially designed text fonts and ICONS on your picture
- Incredible Resolution allows re-drawing of detail to enlarged sections
- Control Board lets you import your own pictures into your programs quickly and easily
- Convert picture file formats to other product formats
- Smooth those ragged lines with the amazing 'Optimizer'
- Flip pictures for iron-on applications
- Strip colour from your picture
- Reverse picture to negative Plus Crop and Frame pictures.

▸ ICON FACTORY

Assemble Creative Computer Pictures From Popular Graphic Libraries.

- Convert graphics to other formats
- Enlarge and Smooth graphics with the 'Optimizer'
- Convert Hi-Res to Multi-colour and vice-versa with the new 'MRL' (Minimal Resolution Loss) process
- Alter and Enhance graphics
- Crop, Invert, Flip Negative and Strip pictures.
- Create graphics from Hi-Res pictures.
- Overlay graphics on Hi-Res pictures
- Capture graphics from PrintShop Newsroom and create your own pictures
- Reduce pictures and graphics

▸ Graphix Link 64

This simple utility is for GEOS users to convert pictures between Newsroom, Print Master and PrintShop ICON files

Loads and saves geoPaint Doodle, Flexidraw, Computer Eyes and PrintShop and Billboard Maker. Runs from outside GEOS

Cat No. 408 Photo Finish £19.95 • Cat No. 406 Icon Finish £24.95
Cat No. 407 Billboard Maker £24.95 • Cat No. 409 Screen F/x £24.95

Cat No. 954 MEGA graphics bundle pack only £39.95
(Photo Finish/BillBoard Maker/Icon Factory/Graphix Link)

Leroys CheatSheets

▸ All the program command keystrokes are available at a glance at the single die-cut reference card. It fits on the keyboard and surrounds the keys with valuable information. All commands are grouped according to function, and actual keystrokes are shown in bold types, while any variables are represented in italics. Leroys CheatSheets are offset printed for clarity and laminated for years of use.

Commodore 64 & 64C CheatSheets

No 442 BASIC 2.0 £3.95 — No 443 Blank* (J) £3.95 — No 444 Comal £3.95 — No 445 Data Manager 2 £3.95
No 446 Disk 1541 £3.95 — No 447 Easy Script £3.95 — No 448 For The Beginner £3.95 — No 450 GEOS v2.0 £4.95
No 451 Newsroom £3.95 — No 452 Pocket Filer £3.95 — No 453 Pocket Planner £3.95 — No 454 Pocket Writer £3.95
No 455 Simons BASIC £3.95 — No 456 SuperBase £4.95 — No 457 SuperScript £4.95 — No 458 SwiftCalc £3.95
No 459 Word Writer 3 £4.95

Certificate Maker 64

▸ Now's your chance to give someone the permanent pat on the back they deserve. No matter if you know a great athlete, a couch potato, a valuable friend, or a good boss or a bad driver, these are just some of the 200 possible awards with Certificate Maker. You can create a certificate in just minutes, simply choose an award style, the style of border, then type in the name and message, add the date and your name and print. You can even create a list of names on disk and spool print. Ideal for class or group awards! To make certificates a little special a range of two dozen borders including Legal, Lace, Victorian, Bears, Smiles, Ducks and Disks are included. Three dozen pictures on witty colour stickers and many different type styles.

Cat No. 400 Certificate Maker only £19.95

Certificate Library Pack

▸ Add 100 exciting certificates to choose from. Expand the creativity possibilities of your Certificate Maker. The Library Pack also includes 24 new borders plus a top up of 72 stickers. The new certificates include employee acknowledgements, family celebrations, church & club meetings, just say you care & much more. Cat No. 403 Certificate Library Pack only £19.95

NEWSROOM 64

▸ Ideal for all ages, quickly and easily create newsletters or newsheets, posters, flyers, banners for school, work, clubs and user groups. Newsroom is divided into sections. In the Photolab you can select from a library of 600 pieces of art, combine them as you wish, edit them with a powerful set of tools and store them ready for the layout of the newsletter. After typing your news with the inbuilt word processor move across to the layout department and arrange the pages. As editor you have control over the position, style and size of text and graphics. When you have finished you can printout.

Newsroom is supplied with a simple 85 page manual, a reference sheet & 600 clip art pictures.

Cat No. 401 The Newsroom 64 £19.95

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LOW COST SOFTWARE

▸ Fun Biorhythms 64

A fun program which will printout your biorhythmic chart. Enter your birth date and the number of days for your chart and your printer does the rest.

▸ Morse Code Trainer 64

A simple comprehensive package for learning and perfecting Morse Code. Enter a message and then receive or transmit increasing and decreasing the number of words per minute as your skill improves.

▸ Easy Sign 64

Improve you ability to sign the deaf hand sign alphabet with this package. Enter a word, phase or sentance and it is displayed on the screen and you can practice signing it.

▸ Super Disk Librarian 64

A complete disk cataloguing system for the 64. Read and store file names under 15 categories with notes for each file. Then at the press of a button search, sort, print out and manage your disk library. Even prints labels.

Only £3.95 Each

Accessories

Animation Station

Unleash your creativity with The Animation Station a powerful visual communications tool. Suncom's classic touch pad produces all kinds of graphics on your 64 and 128 computer. The Animation Station replaces the keyboard, mouse joystick and light pen as an input device. Move the pen or your finger across the touch sensitive surface and the screens pointer follows you. The Animation station includes a powerful drawing package from the makers of Blazing Paddles, Baudville Inc. The Animation Station works instanly with GEOS, Flexidraw, Doodle and all leading software packages. The Animation Station can emulate Koala Pad adding even more compatibility with your software.

Animation Station
Cat No 002 **only £59.95**

Cartridge Port Extender Cable

The cartridge port on the 64 and 128 is located in a somewhat awkward position - horizontally in the back. It's hard to reach, impossible to see and a general pain. Solution? A three slot mother board? It is great if you have the room, but not if you are working in tight quarters. The true solution, The Cartridge Port Expander Cable. This cable connects to the cartridge port on the computer and lets you plug your cartridge at the other end and since it's flexible you can locate the cartridge upto 11' away. Now we've sold the puzzle so don't delay order today!

Cartridge Port Extender Cable
Cat No 476 **only £19.95**

▸ ICON TROLLER.

Now you can have a compact, fully functional joystick always available for use with you C64 or C128 right on the keyboard! ICON TROLLER is perfect for use with GEOS and lets you save your full-size joystick for gaming. A special connector lets you plug in your full-size joystick without removing the ICON TROLLER. No more hanging cords. It's easy to reach and responds quickly. Cat No 003 only £17.95

▸ MICROBUFFER MINI

Your computer can send data to your printer faster than a printer can print it. Normally however the computer is tied up as long as the printer is printing. With one of our high-capacity Microbuffers, your computer will be able to finish faster and let you start using the computer again while the printer is still completing it's job.

Available from 32KByte to 512KByte of buffer memory - more than 300 double spaced pages - this compact Practical Peripherals stand-alone buffer quickly frees your computer from printing tasks. Extremely easy to install, the Microbuffer Mini can save you hours. Parallel input and output. Works with any parallel printer (Not for use with Commodore - only printers) Includes cable & instructions.

Microbuffer 32K 64K 128K 256K 512K - Call for Prices & Availability

▸ C128 40/80 Column Monitor Cable.

The 40/80 column cable connects your C128 to any composite monitor and lets you switch select between 40 and 80 columns. Plugs into both monitor connectors on the C128. Monitor end has RCA plugs for composite video and audio. Use the 80-column feature in the C128 mode without buying a new monitor. Cat No 479 £19.95

▸ 6ft Serial Cable.

Specially manufactured six feet long serial cables. Move your disk drives or printer away from the computer. Cat No. 480 only £9.95

Super Graphix Jnr.

The standard printer interface for the Commodore 64 and 128. This low cost interface connects between the serial port of your disk drive to the centronic (parallel) interface on the printer.

Power for the interface is taken from the cassette port leaving all ports free. Dip switches for setting line feed etc are located on the top of the interface in a handy to adjust position so there's no need to take the interface apart just when you want to make an adjustment.

To date, every software package tested worked perfectly with the interface. Supplied with complete instructions.

Super Graphix Jnr.
Cat No. 441 **only £39.95**

Universal RS 232 Interface

Aprotek's Universal RS-232 Interface lets you connect virtually any device that uses RS-232 Standard - a printer, a modem, etc - to the user port of your Commodore 64 or 128. The interface doesn't use up your user port either - it features a connector identical to the one on the computer, so if you have another device that usually plugs directly into the user port, you can plug it into the interface instead.

NOTE: This interface will not work with parallel printers. It will only work with RS-232 printers.

Universal R5 232 Interface
Cat No. 477 **only £39.95**

▸ 80-Line Simplified Digital I/O Board.

80-Line Simplified Digital I/O Board has 40 TTL input lines and 40 seperate buffered digital output lines that can each directly switch 50 volts at 500 mA. An expansion socket for a standard ROM or clock/calender cartridge allows you to easily create your own autostart dedicated controller without relying on the disk drive. Has 16 ICs on the board. Unmatched in value. Includes extensive documentation and program disk. Very easy to use.

Supplied with detailed 65 page manual and operating software. Data Sheet available.

Cat No 931 only £129.95

▸ First Dual 6522 VIA Boards

Original Ultimate Interface. Universally applicable dual 6522 Versitile Interface Adapter (VIA) board for sophisticated digital I/O. Great for laboratory data aquisition and instrumentation applications. Widely used for industrial control and monitoring. Easily interfaced to high performance A/D and D/A converters. Provides four 8-bit fully bidirectional I/O ports and eight handshake lines. Four 16-bit timer/counters. IRQ interrupt capability. System is expandable to four boards. Supplied with detailed instructions and software.

Our last 16-channel, 8-bit A/D Conversion Module 'piggy backs' onto 64IF22 dual VIA board (required) while leaving all VIA ports available. Uses National ADC0816 converter IC for 100us conversion time.

Cat No 932 only £129.95

▸ 128D Keyboard Extension Cable

Ever found that the cable between your 128D and keyboard is too short? Now with the Keyboard Extension Cable you can locate the CPU several feet from the keyboard, on a shelf, the floor or under the printer the choice is yours. Cat No 478 only £19.95

1351 MOUSE

moves words - creates pictures

Supplied in a high value pack consiting of The Commodore 1351 Mouse, Mouse Mat, Mouse Holder Plus GEOS 64 v12, Plus Commodore Mug! Cat No 937 Only £34.95

1581 TOOLKIT VERSION 2

What Your 1581 Drive Is Missing

A hammer is a hammer But without nails its not much of a tool The 1581 Disk Drive is a marvel of technology capable of some amazing tricks But without quick and easy access to the drives capabilities you may as well have a 200 paperweight.

The 1581 ToolKit is your ticket to geeting the full value out of your investment in the 1581 drive It gives you the following features -

- ★ Fast Disk Copier
- ★ Byte Pattern Search
- ★ Fast File Copier
- ★ Ultrafast Disk Formatter
- ★ Track & Sector Editor
- ★ Partition Creator
- ★ File Track/Sector Tracer
- ★ REU Support
- ★ Directory Editor
- ★ Relocatable Fast Loader
- ★ Error Scanner
- ★ 64K VDC RAM Support (128)

Knowledge can be a tool too And nobody has more knowledge of the 1581 than David Martin His book "The 1581 DOS Reference Guide" is over 100 pages of detailed information that took over a full year of solid research to complete Now all that knowledge can be yours at a special savings when you order the book with your new 1581 ToolKit

Dont let your 1581 disk drive be a hammer without nails Call us today and start getting your moneys worth from your drive.

THE 1581 TOOLKIT VERSION 2
Cat No 429 **only £34.95**

the 1581 Inside & Out Book With Disk

If you are thinking about buying the 1581 disk drive, then this book will answer most of your questions there are two reviews one technical and the other basic If you already own a 1581 disk drive the book will help you use your drive more effectively utilizing all its power The 1581 Inside & Out covers -

- ★ A beginners guide to partitioning
- ★ Super 81 Utilities review
- ★ Transfering unprotected software
- ★ The 1581 drive technical specification
- ★ The 1581 Toolkit review
- ★ The 1581 Extra DOS Commands.
- ★ Transferring protected software to the 1581
- ★ 1581 Drive Clinic including an analysis of bugs
- ★ Speed tests with JiffyDOS comparisons.
- ★ Diagnostic software for repairing damaged disks

This book is a comprehensive beginners guide to the 1581 disk drive and the Diagnostic & Repair software is included on disk

1581 Inside & Out Book With Disk
Cat No 929 **only £3.95**

Cannon 128

An Old Friend Returns

The total copy/utilities package created just for the 128 and 1581 disk drive

- Nibbler
- Fast Disk Copier
- File Copier
- 1581 Fast Copier
- Parameter Copier
- MFM Copier
- Track & Sector Editor
- Density Scanner
- Error Scanner
- Directory Editor

Supplied on both 3.5" and 5.25" disks with an easy to follow manual. Thrash your 1581 with Cannon and blast it into outer space

Cannon 128
Cat No 928 **only £9.95**

SUPER 81 UTILITIES

Super 81 Utilities is a complete utilities pack for the 1581 disk drive.

- Copy disks from 1541/70/71 to 1581
- Complete partition support throughout.
- Copy 1541/70/71 files to 1581 disks
- Backup 1581 disk with 1 or 2 1581 drives.
- CP/M Utilities with partitioning tools
- Disk Editor (displays in Hex and ASCII)
- Drive Monitor with Fast RAM Writer
- DOS Utilities - format scratch files/ partitions change disk name lock/Unlock files create autoboot files erase track, unscratch & much more Supplied with a detailed manual and is available for both the 64 & 128 in 80 columns

C64 Cat No 930 **only £29.95**
C128 Cat No 945 **only £17.95**

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Best Seller An insiders guide to C64 internals Graphics, sound I/Okernal memory maps & much more Complete commented ROM listings. Cat No 761 £14.95

▸ Anatomy of the 1541 Drive Revised.

Best handbook on this drive, explains all Filled with many examples programs utilities Fully commented 1541 ROM listings. Cat No 762 £9.95

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Collection of easy-to-use techniques advanced graphics improved data input, CP/M enhanced BASIC, data handling and more Limited availability Cat No 763 £12.95

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Dozens of ideas for the BASIC programmer Includes in-depth explanations of PEEK POKE USR & other BASIC cmds Cat No 764 £3.95

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Themes auto expences calculator recipe file stock lists, diet planner window advertising, others, Includes listings. Cat No. 765 £3.95

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All you need to know about compilers how they work, designing and writing your own With working examples. Cat No 769 £14.95

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Understand Commodore,and Epson-compatible printers Packed, utilities, graphic dump 3D plot commented ROM listings. Cat No 771 £12.95

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Detailed information on everything from graphics and sound to advanced machine language techniques Includes Sample programs An Official Commodore book Cat No 772 £14.95

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In depth intro to computers in science. Topics: chemistry physics biology astronomy electronics others Cat No 773 £14.95

▸ BASIC Training Guide A comprehensive guide to learning BASIC on the 64 Cat No 779 £14.95

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Detailed guide on the 128's operating system, explains graphic chips, MMU, 80 column graphics ROM listings. Cat No 774 £16.95

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Filled with info for everyone. Covers 80 column hi-res graphics windowing, memory layout, Kernal routines, autostarting. Cat No 775 £14.95

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Presents dozens of programming quick-hitters. Easy and useful techniques on the operating system, stacks, zero page pointers, the BASIC interpreter and more. Cat No 776 £14.95

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Learn fundamentals of CAD while developing your own Design objects on your screen to dump to a printer Includes listings for 64 with Simons BASIC Cat No 777 £19.95 Including disk

▸ CP/M User's Guide C128

Essential guide for everyone interested in CP/M on the 128. Simple explanation of the operating system, memory usage CP/M utility programs, submit files and more Cat No 778 £14.95

Described, It's Unbelievable, Seen, It's Unforgettable!

I-PAINT

1988. At a World of Commodore show in Philadelphia something incredible happened. A stunning image was being displayed on monitors throughout the exhibition hall. No one who saw it could believe what hardware was driving the image. Word spread like wildfire that someone had found a way to display six seperate well-known pictures, their colour palettes intact, on a single high-resolution Commodore 128 screen!

People demanded to know what paint program could create such a dazzling display of artwork on a C128. The cryptic answer they got was "none...yet".

1990. Rick Kane, the creator of the unprecedented C128 demonstration, is ready to reveal his secret. Unknown to most people, the C128 has a video interlace mode similar to the Amiga's. This mode can DOUBLE the vertical resolution of the computer's 80 column display!

Now Rick Kane is ready to deliver on the C128's mega hi-res promise.

Introducing I Paint (I for interlace). Now owners of the of the C128-D's or C128's enhanced with Software Support's 64K Video RAM Upgrade have access to graphics capabilities that are unsurpassed by any other 8-bit paint package for any other machine!

I Paint allows you to work on a full 640x400 pixel image ON SCREEN! That's the same resolution as an Amiga or IBM in the spectacular VGA mode! And this increased resolution means you can create your art without having to scroll like other paint programs force you to. The ENTIRE image is displayed at once. Additionally, the horizontal to vertical aspect ratio is much more normal than the standard 640x200 display that creates those tall, skinny images we've all seen on Commodores in the past.

That's just the beginning! I Paint also offers a far greater colour resolution than has ever been possible before. I Paint's enhanced colour palette allows you to render images with THOUSANDS of apparent colours! Between the enhanced colour palette and the increased bitmap resolution of the interface, there's nothing that your imagination can create that can't be produced on your C128 in stunning, vivid detail!

I Paint uses an intuitive, mouse driven interface like those found on the best Amiga art packages. It supports all Commodore disk drives, the CMD hard drive and the 1750, 1764 and 1750 Clone RAM Expansion Units. It can also read images created with Basic 8 and Basic 8 compatible graphics packages.

If your artistic talents or ambitions are more than your C128 has been able to handle, you don't need a new computer. You need I Paint!

▸ NB. I Paint requires a C128D or a C128 that has been enhanced with our 64K Video RAM Upgrade. A Mouse is also required.

I-PAINT 128
Cat No 913

only £39.95

500 C128 Questions Answered

Take some of the best minds in Commodore computing today and throw 500 of the best questions ever asked at them. What do you get? The best book ever written on the C128 — that's what!

Five Hundred C128 Questions Answered is written by people like Fred Bowen, a Commodore engineer and Loren Lovhaug, president of the famous Twin Cities Newsletter, the BEST source of C128 information on the planet today, between the two of them they've amassed a wealth of knowledge about the inner workings of the C128 that took years of concentrated effort and hands on experience to acquire. And now they are going to share their knowledge with you.

These clients, who between them probably know more about the C128 that Commodore itself, have teamed up to compile a body of work of supreme importance to anyone who owns a C128. The book is well over 100 pages of probing questions and detailed answers, evenly divided into three sections aimed at the begining, intermediate and advanced C128 user. These are the same questions that you'd ask the experts yourself — if you could. The book was written to be easy to read and as entertaining as it is illuminating.

When Commodore created the 128, they fulfilled the fantasies of many of us. Even today, new buyers are discovering the advantages of the 128's proven technology and huge resource pools of users and software. But having all that power on your desk isn't enough. You've got to know how to USE it!

So, have you got any questions about your C128? Cat No. 491 only £15.95

the TWIN CITIES 128 COMPENDIUM

Do you know why doctors and lawyers specialise? Because narrowing their focus allows them to become experts in a chosen field.

We've got some experts that we'd like you to meet. Loran and Aveneile Lovhaug publish Twin Cities 128, a journal of articles and features dedicated exclusively to the Commodore C128. That's right, JUST the Commodore C128. They specialise – and they and their crew are certainly experts. In fact they are so good that they actually produce the magazine on their own C128s.

Obviously if you want to get the most out of your C128 you will want to subscribe right away. But what about the issues you have missed? Glad you asked!

The Twin Cities 128 Compendium is a collection of the very best information from all those priceless issues you have missed. All the best articles, tricks, tips, rumours, gossip, features, interviews, opinions and editorials are all right here, just waiting for you in an attractive bound volume that was also produced entirely on a C128. (We told you these guys are good!)

Volume 1 covers the very best of issues from 1 to 18. Get yours today. If you own a C128, the C128 Compendium is made just for you! Cat No. 490 only £13.95

128 VIDEO RAM UPGRADES

When Commodore released the 128D, we got one, opened it up, and took a look. It didn't take long to discover one MAJOR difference. The C128 has 16K of video RAM, while the 128D has 64K, that's 400% more!

We knew that there were tremendous advantages to the extra RAM. Like being able to scroll through video memory, or the potential for greatly enhanced colour resolution. And, since Commodore has seen fit to make it a standard feature on all 128D's, we knew it was only a matter of time before newer software started taking advantage of the full 64K.

That time has arrived. Programs like Maverick, Fastrac 128, I-Paint, BASIC 8 and many others have been coded to take advantage of the full 64K of video RAM found on the 128D's. So if you've got a regular 128 or the 128D Portable with 16K of video RAM, you've got a problem. And we've got the solution!

You could upgrade on your own — but if the thoughts of splattered solder and heat-damaged motherboards bother you, relax. We've developed a module that plugs right inside 128. Just open up your 128, remove the RF shield and the lid that covers the metal box on the motherboard, and pull the socketed 8563 into our board. Replace the covers & you're finished. No soldering, no hassles.

This package is available in two different forms. Model A has all parts necessary to complete your upgrade, and Model B is identical except that you supply the RAMs. Again, no soldering is necessary.

Both models include easy to follow installation instructions, a test program to verify proper installation, and the plug in Upgrade.

Cat No. 914 Model A **only £29.95**

Cat No. 915 Model B **only £19.95**

COPY PROTECTION REVEALED

Your Education Starts NOW!

Copy Protection has always been one of the most fascinating aspects of software engineering. A battle of skill and cunning between people who want to know more and people who don't think they should. An understanding of copy protection has always been the dividing line that seperates the average user from the total hacker.

If you're ready to cross that line, we'll point you in the right direction. On this one page, you'll find resources that can provide you with all the answers you're seeking. You'll find several years worth of expert knowledge, the accumulation of thousands of hours of exploration and experimentation, all gathered together into the finest tutorials available from any source. In other words, this is where you'll find the answers to all your questions. Don't settle for anything less than complete control of your hardware and software. If you've always wanted to master the secrets of copy protection, now is your chance.

THE
CSM Program Protection Newsletter Compendium

From 1984 to 1986 the Program Protection Newsletter was a light shining in the darkness. While most Commodore users were being held hostage by awkward and potentially destructive copy protection schemes, a few of the best and brightest minds in the user community turned their talents to finding ways to defeat the protection. The newsletter became the forum for this activity.

Each month, the Newsletter provided three to five specific examles of different types of protection schemes. The Newsletter took its readers along the fascinating journey with a detailed step-by-step tutorial on how a copy protection scheme was identified, defused and rendered harmless. And while the Newsletter itself is no longer available, the knowledge is.

The CSM Program Protection Newsletter Compendium is a compilation of the very best of the Newsletter during its 3 year run. Now YOU can own the very best of all that the Newsletter ever was. Whether you're a novice looking for a place to begin, an experienced pro wanting to acknowledge his roots, or a collector of Commodore history, the Compendium is a must own item! Here's a sample of the topics covered:

Step-by-step instructions on adding 8 or 16K RAM to your disk drive. How to key in software utilizing the expanded RAM. Many technical explanations of little known facts regarding your computer and disk drive. Instructions on custom ROM modifications. Countless tricks and tips invaluable to users who want to get the most from their equipment. Instructions on how to copy or completely break the protection schemes. Most have detailed explanations on exactly how to find and defeat the copy protection. Over 200 pages of useful information for all serious Commodore owners.

On the journey to understanding the mysteries of copy protection hacking, the CSM Newsletter Compendium is the best place to start. Cat No. 410 only £29.95

CSM
program protection manuals

In the mid 1980's CSM was a central clearing house of some very specialized information. It was the hub that the pioneers of copy protection hacking revolved around and all the knowledge and expertise that passed through CSM has been captured, enhanced and laid out in two volumes of superb quality that could forever change your relationship with your Commodore computer and your software.

Bob Mills, Master Programmer of the Maverick, says this about the CSM manuals: "They are absolutely essential for understanding the fundamentals of copy protection. I recommend them to anyone seriously interested in protecting or deprotecting software." Why? because if you're looking to pursue the path to true mastery of your 64, the CSM Manuals will provide a solid foundation to build upon.

The CSM Manuals are perfect for learning the basics of the complex and fascinating art of hacking copy protection. They provide a rich overview of the entire range of issues involved, such as optional forms of legal protection. Things like trade secrets, patents, copyrights and trademarks are all discussed. Protection for BASIC programs, 1541 Disk drive protection. A course in machine language monitors. Even protecting your own software is covered. And all that is just Volume 1.

Volume II goes on to include information on the evolution of copy protection schemes, archival copies and user's rights, an introduction to software law, autoboots, interrupts and resets, compilers, undocumented opcodes, encrypted programs, machine language, the 6510 and the PLA, GCR data recording and the reading of GCR code, custom DOS routines like half tracks, extra sectors, modified formats, decryption & decoding techniques, eprom design & over 40 pages of tips from the experts of copy protection hacking!

Unsurpassed even today as THE definitive source material on Commodore hacking. The CSM manuals are the perfect bridge between the introductory Program Protection Newsletter Compendium and the powerful, graduate course, presented in the Kracker Jax Revealed Trilogy package of expert tutorials. Whether you're new to the subject or a seasoned pro who wants a broader overview of the discipline, the extraordinary art of hacking copy protection will never look the same.

Cat No. 412 Volume 1 £29.95 • Cat No. 411 Volume 2 £24.95

KRACKER JAX REVEALED
TRILOGY
ALL THREE VOLUMES - ONE LOW PRICE

Kracker Jax. The name itself is legendary in the Commodore world. When they came out, Kracker Jax parameters were the most advanced archival method ever created. Simple, elegant and total in protection schemes. These parameters quickly became recognized as being the very best. Kracker Jax Revealed is the ground breaking series of tutorials that passed the Kracker Jax secrets on to a whole new generation of hackers. Originally published as three separate volumes, we have recently repackaged the series into one complete volume known as the Kracker Jax Revealed Trilogy.

In book one, you'll learn the basics of copy protection. Twenty specific step-by-step tutorials involving software from Activision, Epyx and other software giants will help you begin to develop a working knowledge of the terms & concepts that will become essential as you progress.

In book two, you'll use your basic grasp of Machine Language to tackle. Twenty additional tutorials involving tough schemes used by manufacturers such as DataEast, Firebird and even Berkeley. You'll create parameters that not only copy a program, but actually DE-PROTECT it!

Finally, book three will take you deep inside the 1541 drive itself, where today's deadly new breed of copy protection hides itself. Not for the novice, we recommend that you master books one and two before trying this one. But when you're ready, book three can take you to places you've never seen before. It will even teach you how to create your own protection schemes!

This is the information that will give you the ability to take total control of your software. When you're ready to cross the line that divides the beginner from the expert, Kracker Jax Revealed is ready to help.

The Kracker Jax Revealed Trilogy
(Books 1, 2 and 3)
Original value £75 NOW ONLY £29.95
Cat Nr. 927

BONUS: With your order you'll automatically get our famous Hackers Utility Kit (a £19.95 value) FREE! This ML program was put together from the wish list of the best programmers in the business. Features include a GCR editor, a byte pattern finder, a file track and sector editor, relocatable ML monitors and much more!

Also you may take your pick of a Reset switch or a ResMon cartridge (sent by default if no preference is expressed) included FREE with your order for the Kracker Jax Revealed Trilogy! Offer valid only while supplies last!

ATTENTION: If you have an incomplete collection, we still have a few individual copies of books 1, 2 and 3 left available individually while supplies last!

Book 1 + Reset Switch Cat No. 421 £19.95
Book 2 + ResMon Cat Nr. 422 £19.95
Book 3 + Hackers Kit Cat No. 423 £19.95

TimeWorks Software

▸ All these programs are by Timeworks a company who has supported the Commodore for many years. All Timeworks software programs include tutorials, help screens and all the general features you expect of high class software. The programs have been properly converted for England and support the little things such as the pound key And just for the 1990's they all swop data between themselves and are now compatible with GEOS Timeworks software is available, at no extra cost on the 128 in 128 mode supporting both the 80 and 40 column display

No. 509 Word Writer 3 64 £39.95
No. 511 Data Manager 64 £39.95
No. 512 SwiftCalc 64 £39.95
No. 745 Word Writer 128 £39.95
No. 746 SwiftCalc 128 £39.95

▸ Word Writer 3

Word Writer 3 has more features more power and is easier-to-use than any other 64 word processor An 85,000 word spell checker plus unlimited custom dictionaries plus an integrated Thesaurus with over 60,000 synonyms and alternatives Word Writer 3 also includes an integrated Outline processor that quickly organizes notes facts and ideas into an outline format A powerful combination of tools Word Writer 3 has an 80 column preview mode, on screen highlighting actually prints on screen your text incorporating underline bold face italic, superscript and subscript Word Writer 3 has many other features including SwiftKeys to access commands quickly with the minimum of keystrokes, headers and footers and is very easy to setup.

▸ DataManager 2

A highly flexible filing and recordkeeping system that stores retrieves sorts evaluates and updates large amounts of information Data Manager 2 features a Report Writer for generating customized data reports You specify the title location and sequence of each column. A Label Maker prints your name and address file onto standard mailing labels, and transfers and prints text information on to labels and tags. Data Manager 2 features quick access to important information retrieves and prints items by name, date range, index code or any category stored in the system. Data Manager 2 calculates numerical data from column to column and field to field and allows you to perform spreadsheet tasks such as wages and cost estimates

▸ SwiftCalc

A powerful easy-to-use electronic spreadsheet SwiftCalc features Sideways which prints all your columns on one continuous sheet sideways! 250 Rows & 104 columns provides more than 25,000 cells in which to place your data. SwiftCalc performs most mathematical functions upto 12 digits Allows for the use of minimum & maximum values exponential notation Perform financial analysis functions calculates the present, future value of the pound & the present & future value of a constant amount (annuity) SwiftCalc is also quite advanced, it can produce what if? Reports, applying mathematical functions and algebraic formulas to any spreadsheet type analysis Calculates formulas & produces complicated what if? Reports at the press of a key

Digital Solutions Software

These are all the wonderful things you can do with your Commodore 64 or 128 and Pocket 2 Software This is the software that can make you an ace in 30 minutes, even if you've never touched a computer before.

The reason? Pocket 2 Software is menu driven. It has all of the help and instructions you need right on the screen. All of the power of your computer is right there at your fingertips It's such an exhilarating feeling you might find yourself humming the theme to Batman

▸ Fast, Flexible and Affordable

At Digital Solutions we're commited to making our software work for you Naturally all Pocket 2 Software is integrated and GEOS compatible It's people logical, not just machine logical. All those wonderful things you've heard about Pocket 2 Software are true Just wait until you get your hands on it.

Each package includes both the 64 and 128 versions 128 Versions operate in 40 and 80 columns If you need more information, FSSL have produced an information pack on all Digital Solutions Software business packages.

▸ Digital SuperPak 2

One of the beauties of Pocket 2 Software is that all three programs work together they're more powerful and give you a whole range of options and possibilities.

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An invaluable low cost tool for all 64 users. Sprite Aid lets you define sprites on a large grid on your 64 screen using either the keyboard or joystick. You can quickly and accurately create even the most complex sprites in either high resolution or multicolour mode. The sprites also appears in normal and expanded size so that you can see how they will look in your programs. Sprites can be stored as DATA statements with access routines for your programs. Cat No. 942 only £8.95

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The Assembler is recommended as a companion to Pascal 64. Pascal 64 has the facility to create a symbol file containing the addresses and names of the variables used. This file can be read by the Assembler thus offering the possibility of passing variables to a m/l program. Programs are written using the built in BASIC editor. Cat No. 943 only £17.95

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TECHNO-INFO

Aunty JASON answers more of your problems

First of all let me say hello. I hope that you will all enjoy reading, and that some will benefit from, this month's selection of letters. There are ten relatively short queries this month, quite varied in content so there should be something for everyone. Before we begin, an apology and correction. Last month there was a letter published from Jochen Kaufmann who of course lives in Germany, and not in Plymouth as was printed. Errors like that don't often occur and I am bewildered about how the confusion occurred. Still, I hope Mr.Kautmann didn't mind his quick trip over to Plymouth!

This month also sees the beginning of a new quarterly feature of Techno Info. That being 'The Techno Info Challenge'. I shall lay down a few rules about something and ask you to perform a certain task whilst still obeying those rules. I will set a standard for you all to beat and the first person to do that will receive a computing-related prize! Nothing huge, but something as an incentive to take part in the challenge. This month the subject is prime number analysis, the generation of prime numbers. There are further details later, and I hope that this will give some of you the chance to involve yourselves a bit more in the magazine. On with the show...

EXTERNAL PROBLEMS

Dear CDU,
I bought a C64 at the end of 1984 and a slightly second-hand C128 a couple of years ago, and have only now discovered your mag. Sorry! You could clearly have saved me a lot of heartache. But here are a couple of problems that still puzzle me: Firstly, why does all Commodore literature insist that it is not possible to make a Commodore printer underline? My Pocket Writer program and STAR SG10C printer, using the MPS1000 driver, has no problem. Secondly, why do my Quickdisk+ and COMAL cartridges for the 64 work perfectly on the 128, when the Final Cartridge II and Wordcraft 40 do not? Even if they run on start-up, they rapidly become unstable and useless, though they are still fine on the 64. Any ideas?
Brian Caukwell, Bancroft.

Dear Brian,
I am glad that you have now discovered CDU and I hope that you continue to enjoy it. The simple answer to your first query is that I don't know because I don't write it. I agree with you that all the books say that you can't do much with a Commodore printer in the way of extended features, but clearly from what you say it is possible. The MPS1000 has a multitude of additional features like underlining, including superscript, subscript, bold and NLQ. Another Commodore printer with advanced features is the MPS1250. It is probably because they are all basing their knowledge on the early standard printer - the MPS801. On your second point it may be to do with the age of the cartridges, and perhaps they are not fully compatible with the 128 start-up procedure in the way of converting to C64 mode when a cartridge is plugged in. The pins could be dirty or connections could be loose, but without knowing the exact problem I can't expand on that matter I'm afraid. I suspect, though, that it is likely to do with the software in the cartridges rather than the hardware. I am always a bit worried about telling people that chips have blown and that sort of thing. Have you tried the cartridges on anyone else's 128? Perhaps this would clarify whether it is to do with general incompatibility between those mentioned cartridges and the C128.

WANTED: ROUTINES

Dear CDU,
I need two routines please. First of all I need a routine in BASIC to load the directory of a disk. Please could you send me one or include one on a CDU disk so that I can see how you have done it. I have tried to write one but have had no luck. Secondly, I want a routine in machine code to scroll messages at the bottom of the screen. I hope that you can help with these
Shaun Ore, Birmingham.

Dear Shaun,
On the disk you will find two programs for you, "PROB1A" and "PROB1B". The first is the BASIC routine to load the directory of a disk into memory (it displays it

as well and the second is the source code listing that you need to scroll messages. The latter is a super-smooth scroll and not your standard rough scroll - I hope you like it. Both programs have comments in the listings to tell you what is happening. I hope you find them useful.

FUER DAS ANDERE COMPUTER

Dear CDU,
On the subject of your magazine, I bought a copy to use the disk program "I.L.S. (The German Program)". However, when I read the magazine at home I found that it was for the Commodore 128 - and I have a Commodore 64! Is there a Commodore 64 version available? Could you ask the Editor, Paul Eves, to ensure that in future issues he clearly identifies in the index which program is for which computer.
D.Buley, Gloucester.

Dear Mr Buley,
First of all I would like to clarify my title. "Fuer das andere Computer" is the German for "For the other computer". It makes sense when you know what it means, doesn't it. So far as I can ascertain there has not been a C64 version of ILS written. I have mentioned your request to Paul and I have suggested that programs for the 128 have the number of that computer in brackets after their title in the index. That is as much as I can do on that score. Thanks very much for your letter and your suggestion.

(ED's bit - My apologies to everyone that mistook this program for a C64 one. Unfortunately, whilst editing the contents page I inadvertantly cropped the line that says "for the C128". Once again my apologies to all!

ACCOUNTING

Dear CDU,
In your September 1990 issue, the disk contained a "Banking 128" program. Is there one available for the C64? If there is not one available can you put me in contact with a company who may have C64 software for home accounts or similar.
S.F.Musco, Surrey.

Dear Mr Musco,
As far as I am aware there is not a commercially available program for the Commodore 64 that performs the exactly same tasks as "Banking 128". That is of course a cue for someone to write and tell me there is, so if anyone knows different, please inform me. The program that I use for accounts is actually a wordprocessor, Superscript. A lot of things can be done automatically like column addition and so forth because it features a calculator. This seems to be perfectly reasonable for small home accounts for general usage. It allows you to enter the date and description of transactions together with the amount. You can total up the debit and credit columns at the end of each month and store those in the calculator and so on. But would a standard spreadsheet suffice? There are many of those available. A couple of companies that may be able to put you on the track of programs that come close to "Banking 128" are Evesham Micros and FSSL. The telephone numbers are 0386-765500 and 0386-553153 respectively.

ABBREVIATIONS

Dear CDU,
I am what you may call a novice when it comes to computer programming but I am always interested in what things mean when it comes to computer terminology. As you will appreciate there are many abbreviations used in computing and I have not been able to find out what they all mean yet. Perhaps you could help me with a few. I know that IRQ stands for Interrupt ReQuest and NMI is for Non-Maskable Interrupt because they are in my reference books, but what about ASCII, CPU, DIP, EPROM and MODEM. Although on the last one I am not sure if it is an abbreviation for anything. Please could you shed some light on these for me.
B.Massie, Lincoln.

Dear Mr.Massie,
I certainly can help you with those abbreviations. ASCII stands for American Standard Code for Information Interchange, CPU for Central Processing Unit, DIP for Dual In-line Package, EPROM for Erasable Programmable Read-Only Memory and MODEM is in fact an abbreviation for MOdulator/DEModulator. I would imagine that you know what each thing is and so I won't go into any depth on what an Eprom or a Modem is, for example. I hope you have found those a help.

AUTOBOOT 128

Dear CDU,
In the September 1990 issue of CDU there is a program 'Autoboot 128" by Mark Hope. I have tried several times to get this program working and have failed miserably. Can you please explain how to work it? Also can it be used to boot programs other than CDU menus? I have no machine code knowledge of any description.
Peter Fairer, Tyne and Wear.

Dear CDU,
In your September issue there was a program on the disk that allowed you to load the menu using the 128's autoboot feature. I cannot work out how to use it as there were no instructions of such that I was aware that told you whether or not the program had to be just either copied to the disk required and then used by switching the drive on, or whether you have to move the program within the directory to the first file on the disk or what. Have I had a corrupted disk or am I not doing it right, or is the machine at fault? I have Mirrorsoft games and they autoboot from 128 to 64 mode perfectly.

Mike Nicholls, Sutton Coldfield.

Dear Peter and Mike,
You are right in that there were no instructions for installing the autoboot code onto your disks and that was a real shame because it is such a useful little routine to have if you use a C128. What must be done is as follows. The machine code that loads from $0B00, and not the BASIC program, has to be written to track one, sector zero of the disk. The program then does not appear in the directory and it is not in fact copied as any sort of program. The code is just transferred to the disk so that the 256 bytes fill that sector. If some other program is already using that part of the disk then you cannot put the autoboot onto that disk. The best thing is to put the autoboot on the very first sector of your disk as soon as it is formatted. In that way you will know that the sector is free when you want it. Now you will ask how to transfer it to the first sector, which is quite understandable. Well, it needs a knowledge of the drive's direct access commands and you don't tell me whether you know how to use them, so on this month's disk for you and everyone else who has written about the program, there is a file "PROB2" that you can run in 64 mode. This will present you with on-screen instructions. Just follow them and the autoboot program will be transferred in the necessary manner to your chosen disk, assuming that the sector isn't already used! To answer one of Peter's questions, it can be used to boot any program although this one has been written so that the program booted must have the name "MENU". This can be altered if you wish but that involves knowing what machine code to change to alter the length of the filename and so forth. I hope I have been of some assistance.

CDU GEOS FONTS

Dear CDU,
I have recently purchased a copy of GEOS v1.2 with which I am very pleased. The problem that I have is trying to load the fonts that were published in volume three of CDU. Unfortunately I haven't got the first set and of course the instructions, and no matter what I do I can't figure out how to use them. I can load them into GEOS ok, so that they are displayed on the desktop as a non-GEOS file, but I can't figure out how to make them run within the GEOS suite. I hope that you can help.
Neil Love, Shropshire.

Dear Neil,
When you first opened the CDU disk from the desktop you should have been asked if you wish to convert the disk to GEOS format. You should do that, and that is the only instruction given in the first issue that included the fonts. However, I don't believe that converting makes a lot of difference as to what they are displayed as. My disks showed up the files as Fonts although I had answered 'no' to the conversion of the disk. I also know that validating the disk doesn't alter the status of them and so I can't imagine what has happened. If you haven't converted the disk to GEOS format, then do it and see if it helps. With the basic GEOS disks you can't convert the Fonts from a standard program into a font, I don't think, so if you still haven't had any luck, contact us again and I shall forward you a disk with the full set of twelve fonts on it.

DOMINOES

Dear CDU,
I have a problem that you may be able to solve. In the March/April 1989 issue of CDU, the game "Dominoes" was on the accompanying disk. Every time I use this program I get annoyed because the computer 'cheats'. When it has the option of making the number the same on both sides it puts the domino on the left hand side of the board, sometimes going 'up' and sometimes leaving the numbers as before. For example if the top numbers are 0 and 2, and it plays 2-0, it may go 2s up or leave the numbers showing as 0 and 2 - it plays the 2 on the 0. Has anyone else noticed this before and found the error in the program? Can someone please provide the solution to make it work properly. Maybe Athol McEwan who wrote the program could.
W.L.Weighill, Lincolnshire.

Dear Mr.Weighill,
"Dominoes" is a very long and complicated BASIC program with scores of IF...THEN statements and it would be difficult to see what was causing such an error. We have not had anyone else noticing the error and I have never noticed during play although I have no doubt that you have spotted an inconsistency. I have examined a printout of the program very carefully and can only spot one place where there seems to be an inconsistency in the programming. It is in the group of IF...THEN statements in lines 2260-2290 and to be precise I would think it is line 2270 that is causing the problems. The line reads: 2270 IF L=V2 THEN V2=L: V3=L: V4=R: GOSUB.. The first statement makes no sense as it stands. Why make V2 equal L, if you have just checked to see if L equals V2? By comparing with the lines around it, it would seem that the first statement after the THEN command should be V1=L. If you examine that part of the listing you will see why that is so. Change line 2270 so that the first part reads IF L=V2 THEN V1=L: V3=L: V4=R . and see if the error still occurs. I think that may have solved it.

PET GROUPS

Dear CDU,
This is just a short query. I have a PET with twin disk drive and printer. If you could let me know of any user group dedicated to the PET then I will be very grateful if you could supply the contact name and address for me and from where I can get any PD software.
Trevor Porter, Cumbria.

RELATIVELY SPEAKING

Dear Trevor,
The address of ICPUG, the Independent Commodore Products Users Group, is ICPUG, PO Box 1309, London, N3 2UT so far as I know and they are the people that you should get in touch with for information on the PET and public domain services.

Dear CDU,
I have never seen a routine for sorting a Relative File Database on a C64 except in YC Magazine in 1988. There was an excellent series on relative files by Eric Ramsay but there were so many errors in the sort routine to make it useless. Could you provide an article on relative files and publish a corrected version of the sort routine.
P.R.Marchant, Kent.

UPDATE

Dear Mr.Marchant,
Hopefully appearing in a future issue of CDU will be an article on relative files with accompanying demonstration programs that I am writing at the moment. It will be a two part article, the first month laying down the theory and so forth of relative files and setting them up and then the second month will present such things as sort and search routines if all goes according to plan. However, the usual method is not to sort the relative file but to have an index, keeping track of the contents of just one of the fields for each record and then to have the corresponding record number included with that data. This is then stored as a separate sequential file and it is the contents of the sequential file that are altered and not the order of the records within the main relative file. However, we shall see how things go. Keep a lookout for the articles, **The Theory of Relativity.**

I would like to thank MR WOODS OF MERSEYSIDE for sending us a copy of the INPUT magazine that was requested by MR SPARROWHAWK OF WEST SUSSEX, and also MR SPONG for forwarding the disks for MR NISBET OF PLYMOUTH. Both have been passed on and gratefully accepted. Thanks also to the other readers who offered help in those cases. MATTHEW LANGNER OF HATFIELD has pointed out for NEIL MARSHALL OF HEREFORD that a copy of the Pascal Programming Language can be obtained from FSSL, Masons Ryde, Defford Road, Pershore, Worcestershire, WR10 1AZ (Tel: 0386-553153).

THE TECHNO-INFO CHALLENGE

The very first of the Techno Info challenges is quite tough I'm afraid. What I would like you to do is write a program in standard unextended Commodore BASIC that will CALCULATE every prime number between 3 and 19997 inclusive and display each one as it calculates it, together with the time elapsed up until that number was displayed. Not such a tall order some of you are beginning to think. But wait until I tell you that there are 2261 of them, and I want you to do it in less time than my program takes, that program being on this disk filed as "THE TI CHALLENGE", and the time being approximately six minutes.

Still some are thinking it will be easy. Have a go and let's see if anyone can beat the first TI challenge. A little background on the algorithm that my program uses. It is called "The Sieve of Eratosthenes", a very grand name, and the original algorithm was written in the language 'C' and shown to me by a mate, Peter Simpson - cheers!!! It takes less than one second to produce the number '3' but you must wait nineteen seconds before it calculates '5', though it quickens to give '7' after a further twelve seconds, and then '11' after only nine! You may then wonder how it can plough through 2261 prime numbers in less than six minutes. Quite easy - it speeds up as it goes along. It could be called an intelligent algorithm because once it has found one prime, it strikes off every multiple of that number because they can't be primes in themselves. For example, when it has found 11, it will ignore 22, 33, 44 and so on. When it really gets going the algorithm can pump out seven or eight each second, even using Commodore BASIC, and in some cases less than one tenth of a second elapses between the calculation of consecutive primes!

Now perhaps you see it is rather a tall order but someone out there must be able to beat it, or I will have to keep the prize myself! So, can anyone write or produce for me a standard unextended BASIC program that will calculate and display (and not just display!) every one of the 2261 prime numbers between 3 and 19997 inclusive in less than 355 seconds? If you can then you could be in line for the first Techno Info Challenge prize!!! I wish each and every one of you the best of luck. Send your entries to the normal Techno Info address but please mark your envelopes "CHALLENGE". Don't forget to load the disk file to see exactly how this algorithm performs

TIP OF THE MONTH

This month there are some POKEs for C128 users for a change. They come to you courtesy of PETER FAIRER OF TYNE AND WEAR. Take it away, Peter.

POKE 241,x changes character colour; POKE 792,100 will disable RESTORE (792,62 to reset to normal); POKE

808,100 will disable STOP+RESTORE (808,110 to reset), POKE 808,112 to disable just STOP; and POKE 2594,x will autorepeat keys, where 'x' is 0 for just the space bar and cursors, 64 for no repeats, and 128 for all keys repeat.

Thanks for that Peter. And also this month we have news of a detailed method for cleaning your 64's keyboard out. Having heard of the plight of the gentleman whose keyboard got clogged up with cigarette ash, MR HEAMS OF HERTFORDSHIRE sent us his "masochist's confession" on how to go about degunging your keyboard. It is too lengthy to print here, I'm afraid, but below is a quick run-through of what you will need in the way of tools, and if anyone would like a copy of the full instructions, please send a request to Techno Info and I'll send a copy on to you. I'll let Mr.Heams explain further...

You will need: A number 0 or 1 crosshead screwdriver; a medium sized flathead screwdriver; a selection of jeweller's crosshead screwdrivers, a bottle of "Tippex" or tin of cellulose paint; two dozen M3 x 20mm, countersunk steel machine screws, nuts and washers (imperial equiv. 6BA x 3/4"); a handdrill; a clearance drill, 3mm (imperial equiv 7/64" but 1/8" will do); a countersink drill, 5.5mm (7/32"); some cleaning fluid (Iso Propyl Alcohol); a diagram of the keyboard in case you forget the layout of the keys; a small (15-20 watt) soldering iron; a small spool of cored solder; and finally (and in my view it's probably most important - TechEd) a resolve not to worry about having to lash out forty quid for a new keyboard if all proves a disaster!!

Thanks. Nothing like boosting confidence! You can probably tell from that list that it is a pretty thorough job that you will be doing and so if your keys have to fight their way through a layer of gunk every time they are pressed, do not hesitate to get in touch.

That's all for this month. Don't forget the challenge and don't forget to keep sending us your tips. And if you have any programming or software problems, please don't forget that we are here to help. Just take the time out to drop us a line at CDU Techno Info, 11 Cook Close, Brownsover, Rugby, Warwickshire, CV21 1NG. See you in April!

AUTOMENU

A menu maker program with a difference. by PAUL GANDER

This program constructs a menu by reading through the disk's directory and storing all of the filenames that begin with a full-stop. This means that the menu is automatically updated whenever you SAVE, SCRATCH or even RENAME a program. Also, the number of programs you may have on the menu is limited only by the capacity of the disk. Unfortunately, it also means that you may only LOAD and RUN Basic programs directly from the menu. This is because there is no practical method of indicating the execution address of a machine code program. However, by writing a simple Basic loader, which can be RUN from the menu, it is not only possible to execute machine code programs but also to load MULTI-PART programs or even to install a fast-loader. Here is an example of a simple loader program;

```
10 A=A+1
11 IFA=1THENLOAD"filename",8,1
12 IFA=2THENLOAD"filename2",8,1
13 SYS49152
```

INSTALLING AUTOMENU

Load and Run "AUTOMENU SAVER", or select it from the CDU menu. After the opening message you be prompted for an input. You can enter any DOS command that may be required to prepare a disk for installation. For example, the disk may need formatting or, if there are any Basic programs already on the disk, you might like to RENAME them with the full-stop prefix. You can also view all or part of the directory simply by entering "$" (followed by the relevant pattern matching characters if you wish to be selective.) Entering an "*" will commence installation and a "back arrow" will return you to Basic. Should any problems arise, you will be informed by way of a disk status report. If necessary, use the DOS commands to correct the errors and try again.

USING AUTOMENU

It is always a good idea to reset the computer before you load a new program. As AUTOMENU is always installed as the first entry in the disks directory, you may load it by entering;

```
LOAD"*",8,1
```

The program will start automatically and begin reading the directory. The menu will be displayed in pages, each containing up to sixteen filenames. Use the cursor LEFT/RIGHT keys to select the relevant page and the cursor UP/DOWN keys to select the filename. Finally, press RETURN to LOAD and RUN the selected program. That's all there is to it!

DESIGNING A ROLE PLAYING GAME

This month GORDON HAMLETT looks at GAME MANAGEMENT

This is the fourth and last article about designing role playing games. The first three articles have concentrated on the major building blocks of a game system - the characters, combat and magic. This month, I am looking at a few bits and pieces which show how you, as game designer, can keep control of the game and ensure that it plays well.

GAME LOCATIONS

Have you ever stopped to consider why so many role playing games are set on ISLANDS? The answer is a simple one. It is merely a device so that the programmer can control where the player can or cannot go. The alternative of a sign in the middle of a desert saying 'Do not venture beyond this point' reduces the game's credibility quite considerably.

DUNGEONS and BUILDINGS don't have the same problem as they have natural boundaries to keep the player within set limits. One extra advantage of maintaining the wilderness this way is that you can include offshore islands or outlying asteroids that the player must visit which in turn require him to find a ship, navigate successfully, fight off sea creatures and so on; a whole range of activities that wouldn't necessarily appear in a land locked game

OBJECTS AND DEVICES

One of the main problems that I come across time and time again is the inclusion of objects or devices which, whilst very pretty, add little or nothing to the game It is all very well to offer a player the choice of **SHORT SWORD, LONG SWORD, TWO HANDED SWORD, BROAD SWORD, BASTARD SWORD, HAND AND A HALE SWORD, SCIMITAR, CUTLASS, RAPIER, SABRE AND EPEE** etc., etc but do you really need all of them, especially when you take into account magical and cursed variants as well. Could your resources be better used elsewhere?

The same applies to specific articles of armour, types of food available at the local tavern and even the bewildering array of magical spells available to you. OK, so it's nice to have some variety but there is a tendency to mistake detail for realism. One of the problems with Ultima V was that there was almost too much detail. Every piece of furniture had to be searched individually rather than allowing a character to search a room and assume that he wasn't going miss that large eight foot wardrobe in the corner. It is the same with keys. If you have a bunch of keys, it is logical that you are going to try them all in a lock to see if one of them fits You do not want a situation where you have to enter 'use red key - nothing happens Use blue key - nothing happens and so on'.

Think of all the RPG games you have played and write down a list of all the spells, weapons and items that you used most often I suspect that the list will be fairly short and a fraction of those available to you.

It might be nice to have spells available to you that make the enemy slightly easier to hit or your own party move faster but in all fairness, how often did you ever use them. Any adventurer worth his salt is going to wade straight into battle and loose off a fireball. He is not going to use a nice little spell that gives him an extra five per cent chance of hitting an opponent.

CREDIBLE STORYLINE

I believe that where the detail should be concentrated is in making the story line more interesting. You have your basic quest and there is a fair chance that it is going to involve seeking out and destroying some ultimate evil or rescuing a princess or proving your birthright or whatever. What you want to try and avoid is the feeling of just wandering round until you come across the right key for the right door, or the eight segments of the wand of justice or whatever

There should be a number of sub-plots to keep your interest going as well. Rather than let the player explore willy-nilly, divide the game up into chapters, each with its own minor story. Invent different scenarios that sidetrack the player temporarily. You know that it is all a means to an end but because it is written well, it doesn't actually feel like that There is nothing more boring than wandering round dungeon A, killing a few monsters, gaining the treasure, going up a level in experience and then going round dungeons B, C, D, and E and doing the whole thing over again. ARE YOU LISTENING BARD'S TALE?

SUITABLE OBJECTIVES

Mini-quest objectives don't have to be about killing monsters or finding magic gems. Use your imagination or, at a pinch, use and adapt somebody else's! Off the top of my head, here are half a dozen ideas that are sufficiently different to make a player sit up and take

notice. By that, I mean that t haven't come across them in any of the games I have played

1 Betriend a Unicorn. As they only like innocent young maidens, you might have to hetriend one of those too

2 Find a way ot stopping the war between the goblins and the elves. This might involve both camps being extremely wary of you or one side tolerating you with the other lot hating your guts.

3. Intertupt a religtous cecemony Why are two hundred people clothed in hooded robes matching along to a bontire? Perhaps yott will have to acquire some disguises

4. Wait until your party is expetienced enough to have a tew magic weapons and decent armout Then arrange tor an ambush leaving everyone naked and penniless Combat that was previously straighttorward now becomes extremely dangerous and a whole new series of tactics (ie run away) become necessary

5 Polymorph the entire party into ants and set a mini-adventure in an ant hill

6. Force an encounter with a Sorcerer's Apprentice type character (such as the one in Disney's Fantasia) He means well but every spell he tries to cast goes hopelessly wrong

All right, they are not earth shattering ideas but t did say they were otf the top ot my head and with a little work and modification, ate certainly usable
Another idea is to make hetter use of each character's strengths and weaknesses hy having tasks that only one particular group member can partir Ipate in. Fot example, it yout game has hubbits or halflings, then why not have a small hole that only the hobbit can fit through.
This irlea is probably more apparent in si ience fiction games rathet than tantasy. Because the characters have no magic spells,the tendency ts to assign them skills instead. For example, first aid, weaponry, mechanical, computer, navigational and so on. These skills improve with experience and training and at various parts ot the game, a player might need to tise one of these skills successfully in order to progress

NO REDUNDANT FRILLS

As with every othet type ot RPG though, it is important to make sure that there is a neerl for that patticular skill within the game. it you are going to give someone the opportunity to learn how to repair toasters (as in the excellent and much underrated game Wasteland), then you are obliged to have a situation that requires you to mend a toaster (the game does!)
I believe that the Ideal game balance lies somewhete between a hack and slash tole playing game and the traditional adventure It is important to break up the game with text in order to impart i lues. arld description, tell a story, intorm about the next patt of the quest and so on Information can be imparted either by holding conversations with charactets, visiting sages, discovering scrolls, tinding scratched messages on walls or even using computer terminals it you are using a science fiction scenario

IN CONCLUSION

Most Lins of role playing games came to them via the traditional text only adventures and I am sure that there is an underlying need for some sort of mental challenge to he part of the game. You already have a new set of challenges available by developing a combat strategy in the game but the odd situation where you need to think 'now how do I get out ot this' or 'hrow do t go about solving that' wouln definttely not go amiss

C128 SOLITAIRE

A very good C128 version of the board game

PAUL TRAYNOR

C128 Solitaire is based on the English version of the age-old game. It consists of a board with 33 positions and 32 game pieces. The object of the game is to finish with only 1 game piece on the board. Pieces are removed in the same way as Draughts, ie. one piece jumps over an adjacent piece into a empty position to remove the piece which was jumped over. You can only jump in 4 directions, ie. not diagonally, and every move must result in a piece being jumped over and removed. The game is played in 40 column mode using a joystick in port 2.

INSTRUCTIONS

There are two files "SOLITAIRE" and "SOLITAIRE.MC" load and run "SOLITAIRE" and the it will then load the second file. (C128 Solitaire will load from any device 8-11) After the title screen you will be given the game board with the option in the left hand corner of START or DEMO.
Pressing "D" will start the demonstration of how the game should be played. Pressing the space bar will allow you to quit the demo or you can let it run until it finishes, either way you will be shown the screen as before with the two options.
Pressing "S" will start the game.

PLAYING THE GAME

Using the joystick in port 2 you can move the black four cornered pointer around the screen until it is over the piece you wish to move, you must then press the fire button to confirm selection. Next, move the joystick in the direction you wish to jump (this will be indicated by a white four cornered pointer), again press fire to confirm and the jump will then be completed and the piece jumped over will be removed from the board. A move can be aborted when the white pointer is shown on screen by moving the joystick in any direction instead of pressing fire. Any attempt to make an illegal move will result in the pointer returning to the centre of the screen, also if you move off the board at one side you will appear on the opposite side. You can quit the game at any time using the space bar. The game is over when there is only one piece left, at this point the screen will flash a number times and then the starting position will be re-created and you will be given the two options again. If at any time during the game you find you can not make any legal move you must press the space bar to quit and start again. During a game or demo the screen will show, in the right hand corner, the number of moves which have been taken.

ZAKRON

Bounce that ball!! by A.DOCHERTY and P.ATKIN

Back in those dark days of the A...I games console, one of the more popular games had you knocking bricks out of walls with a continuously moving ball. Since then, hundreds of variations have appeared on the scene. Basically they are the same, the main difference being the number of levels and the type of extra weapons that you can release.

A VIEW FROM ABOVE

ZAKRON takes the 'BREAKOUT' theme a little step further. Instead of the normal two dimensional playing area, you play on a three dimensional plane. The idea of the game is to accumulate points by knocking bricks out with the continually bouncing ball. The ball is controlled by the player using a bat, as with all 'BREAKOUT' variations. The difference being that you are ABOVE the playing area.

TIMING IS VITAL

When the ball reaches the bottom of its bounce, and is at its smallest, the player has to deflect it by positioning the bat appropriately. The angle of deflection of the ball depends on its point of impact on the bat. When you first see the game you will think that there is nothing to it! I warn you now, it's not as easy as it looks. Enjoy!!

BASICS of BASIC

A series of Basic tutorials designed to make the beginner an expert

JOHN SIMPSON

Last month we introduced you to this new series for the newcomers to the art of programming their computer using the Basic language. This month we pitch you in at the deep end, so to speak.

For a short while from now on, when pressing the RETURN key is necessary, I will remind you by the use of the abbreviation:- <CR> (which stands for Carriage Return).

Now we are ready to input a PRINT statement. Type in the following:

```
PRINT "HELLO WORLD." <CR>
```

You will notice that immediately you pressed the return key the message HELLO WORLD. was printed under your PRINT statement, followed by a blank line, and then the word READY with the cursor blinking just below this.

What has actually taken place here is that you typed and issued to the computer a "DIRECT COMMAND" Once the computer executed your statement, the statement then ceased to exist, so to speak. In other words it was not a re-runnable or saveable program. After execution of the PRINT statement the computer informed you that the task you had set it was complete, and that it was awaiting your next input. This was the computer's response with the word READY The flashing cursor is a prompt mark, and also informs you of the screen position where your next typed input will be positioned.

We can also assign values to variables and constant labels. A variable is a changing value, whereas a constant remains fixed (we shall be dealing with these later). Here is an example of assigning values to labels, and it is here that we shall introduce another keyword, namely, LET. Type this:

```
LET COUNT = 10 <CR>
```

After pressing the return key nothing will appear to have happened. You will simply receive the computer response with the word READY In actual fact something has occurred, in that the computer has set up a variable using the label COUNT with which to identify it, and it has assigned the value of 10 to that variable. We can check this by using our PRINT command once again Try this:

```
PRINT COUNT <CR>
```

and there below the print statement appears the number 10.

You will have noticed that the first PRINT statement contained quotation marks before and after the words "HELLO WORLD.", but in the second PRINT statement the word COUNT omitted the use of quotes. Why?

Well the statement "HELLO WORLD." is a series of characters placed together to form what is termed a STRING (a string of characters) By placing the characters inside the quotes lets the computer know that this is a string, and NOT a variable or constant label, so it doesn't search through a variable list it may have constructed to find a value assigned to a label, as it will when using COUNT. It knows that you require the STRING to be printed.

"Strings" and variables can also be combined within PRINT statements Here is an example:

```
PRINT "THE VALUE IN COUNT IS"COUNT <CR>
```

and the result:

```
THE VALUE IN COUNT IS 10
```

We can also change the value of COUNT by using arithmetic qualifiers. Type this:

```
LET COUNT = COUNT + 1 <CR>
```

Now if you type

```
PRINT COUNT <CR>
```

you will see that the value held in the variable COUNT has increased to 11. You can use many arithmetic qualifiers, such as + -,*,/ (plus, minus, multiply, divide). You can also use whatever value you may desire for the arithmetic operation Why not try a few various actions However, should you try to divide COUNT by zero, which is obviously not possible, the computer will respond with an error message. In this case:

```
?DIVISION BY ZERO ERROR
```

There are a number of error messages which we will deal with as they occur throughout the tutorials

We can instruct the computer to add together various values held within several variables First, however, we need to set up several variable labels and assign values to them:

```
LET A = 5   <CR>
LET B = 2   <CR>
LET C = A+B  <CR>
PRINT C     <CR>
```

Once more the arithmetic operand can be one of many, as mentioned earlier where we changed the value held in the variable COUNT

Notice that I reduced the length of each label to just one character each - A,B, and C. You can use multiple alphabetical characters as well as numeric characters for variable names, however, there are certain restrictions. If you mix alphanumeric characters, then the label must start with a letter (A1, X26, COUNT10, etc.). No matter how long the label is the computer will only use the first two characters, so if you defined three variables as SUM, SUN, and SUPER, only one variable would exist - SU. The extra characters are allowed so that you may recognise more easily what it is you are storing.

A further restriction is that you cannot use keywords as variable labels, such as PRINT, LET, OPEN, CLOSE, and neither can you use words which contain keywords within them For example there is a keyword named ON, so if you were to attempt to create a label called SECOND, for example, the computer would reject this because ON appears within SECOND.

Try it:

```
LET SECOND = 5   <CR>
```

The computer responds with:

```
?SYNTAX ERROR
```

This is probably the most frequent error message you will come across. As soon as the computer finds something within your statements that it doesn't understand, or conflicts with the syntax it expects, then this is the error message that you will receive.

There are many short cut key actions we can use to save typing in whole keywords, we shall deal with these as time goes by, but probably the most frequently used is the ? to replace the word PRINT. Also, it isn't necessary to place a space after the command word. Let's try this:

```
?"HELLO WORLD."   <CR>

?COUNT    <CR>
```

SOME KEY ACTIONS

Before we continue further, let us take a closer look at the keyboard itself. There are a total of 66 keys Using these keys in conjunction with each other can activate some very useful facilities. We shall take a quick look at some of these

If you press the key at the top right of the keyboard marked CLR/HOME, then the cursor will be relocated to the top left corner of the screen - homing the cursor. By now your screen will be full of characters where we have just been conducting all of the foregoing examples. To clear, and to relocate the cursor prompt to the top left corner of, the screen simply hold down one of the two keys marked SHIFT, and tap the key marked CLR/HOME. Instantly the screen is cleared! When I want you to perform this operation later, I shall use the following abbreviation:- <CLR>.

Hold down the key which is positioned near the top left of the keyboard and marked CTRL, and then tap any key marked 1 to 8 and the cursor, as well as any character typed thereafter, will change to the colour printed upon the face of the key This allows you a selection of eight colours, but there are sixteen colours altogether, so to obtain the other eight colours hold down the commodore key - this is the key next to the left SHIFT key and marked C= - and again tap anyone of the numerical keys, 1 - 8

To create "reverse video", that is to make a character change to its reverse - i.e. dark-blue parts of a character will become light-blue, and light-blue into dark-blue (if you haven't yet changed the character colour!), hold down the control key <CTRL> and tap the numeric key 9 which has RVS/ON printed upon its face. Once you have done this you can print a band of colour onto the screen by holding down the space-bar To get back to normal video, again hold down the control key <CTRL> and tap the 0 (zero) key - RVS/OFF.

On the face of the alphabetical keys, as well as several others are printed two graphic symbols. To obtain the right-hand symbol, hold down the shift key and tap the key with the symbol you require, and to obtain the left-hand symbol hold down the Commodore key and tap the key with the symbol you require

I have outlined these key functions because quite soon they will prove very useful when we start to create actual programs.

So far we have used several keywords but we haven't actually created a re-usable program. This then is our next stage.

LINE NUMBERS

When the computer executes a program, it needs a starting point, and an ending point. Much like runners in a cross country race. The race umpire will give the runners instructions, such as run to the end of the field, cross over a small river, follow the river to a small wall by a wood, then follow the small wall until you come to a green gate, etc., etc.

This is analogous to a program. We give the computer

instructions However, getting back to our race analogy, it may be a novelty race, and when the runners reach the green gate they will receive a new set of instructions The same can apply to our computer program. We issue it with instructions to go so far, where it will receive further instructions.

Line numbers are the basis of telling the computer where to start, and where to go from there. Line numbers can start from line number 0 (zero) up to line number 65,535. However, it is fairly common to start with line number 10, and use line number increments of ten, i.e. 10,20,30,40 and so on.

We use increments of ten for a very good reason. It often follows, when developing a program, that you might find the need to add some instructions within you program: a piece of code you may have forgotten, or whatever. If you had numbered your lines with only single increments, 1,2,3,4 etc., you have a problem of where to place the code which needs to be inserted. It would mean renumbering your entire program to date - Oh! Troublesome! If, however, you had left large steps, then 10, 20, 30, 32, 33, 36, 40 is no problem.

OUR FIRST PROGRAM

We will write our first program using that which we have already done, however, now it will be a saveable and re-usable program; no longer DIRECT COMMANDS. Type in the following

```
10 PRINT"HELLO WORLD."        <CR>
20 LET COUNT = 10             <CR>
30 PRINT"THE VALUE OE COUNT ="COUNT   <CR>
```

Now that we have written our program, we need to tell the computer to execute it. This is done by using the RUN command. So, without a line number type. RUN <CR>. Each time you type RUN the computer will execute the program.

SAVING A PROGRAM

If you now place your formatted disk into the disk drive, we shall now save this program so that it can be retrieved on another occasion. But first, a quick explanation as to why we need to save programs to disk, or tape.

There are two types of memory cells within the C64. One type is called RAM, and the other ROM. RAM is memory which you can write to. The program we have just created did exactly that. It used a block of memory cells in RAM memory and stored the information there. We can also read this memory, for example, when the program printed: THE VALUE OF COUNT = 10 then it had to look for the value in a memory cell which we have labelled COUNT, copy that value (it doesn't take it out, otherwise COUNT would reduce to zero), and print it on the screen

ROM memory, on the other hand is memory which we cannot write too, In other words, we could not have put our program there. But, we can read from it. If all of this sounds complicated don't worry about it, the computer has a large program inside it, placed there by the manufactures, and which manages the system, knowing exactly where to put things.

The point I was making is that RAM memory becomes garbage once you switch off the power to the computer. Each memory cell in RAM is unable to hold information without power, whereas ROM is not lost when you switch off the machine. So, to ensure that we don't lose our important, and hard worked at, programs, we must save them to a storage device of some sorts.

To save to a disk, then, type in the following:

```
SAVE "TESTPROG1",8   <CR>
```

The disk drive light will come on and there will be some drive activity for a moment. The computer will print to the screen the message, SAVING TESTPROG1, and after a few moments the disk drive light will go off and the computer will print the familiar READY, prompt.

LOADING A PROGRAM

Of course later we may need to get the program back off the disk and into the computer's memory. At this point If you switch off your computer, wait a moment, then switch it back on the program we just saved will have gone. Now we can load the program back into memory. To do this we must know the name of the program, and then we simply type:

```
LOAD "TESTPROG1",8
```

Once again the disk drive light will come on and there will be drive activity This time, however, the computer will print, SEARCHING FOR TESTPROG1. If you mistyped, or used a disk without TESTPROG1 upon it, the computer will respond with the error message, ?FILE NOT FOUND ERROR.

LISTING A PROGRAM

It may be that during the course of writing a program we may wish to view the program list, so, without a line number, simply type:

```
LIST
```

This will cause a listing to scroll onto the screen. If the list is too long for the screen size then it will start to scroll off the top of the screen and onto the bottom. You can slow the speed of the scroll down somewhat by holding down the control key <CTRL>. You can also list just a part of the list with, LIST 10-20 this will only list the lines from ten to twenty.

If you now clear <CLR> the screen (remember to hold down a shift key and tap the key marked CLR/HOME), and then type LIST, the list of the program we wrote a few minutes ago will reappear upon the screen.

Summary of Part One

We have discovered how to enter into the computer certain keywords together with the action desired, such as PRINT, which can print a character string to the screen by enclosing the string within quotation marks. We can also PRINT the value of a labelled variable by using the variable name without quotation marks.

We have discovered that we can assign a variable with a label and a value by using the LET keyword, such as LET A = 10.

We also found that the PRINT command will allow us to mix strings and variables together printing the result to the screen.

We also looked at some ways in which we can use the keyboard to print graphic characters, change character colours, reverse the characters and to home the cursor, and clear the screen.

Most importantly we found that at the end of a statement on a line we must press the return key to enter the line into the computers memory so that the statement can be computed.

We have also looked at the use of LINE Numbers which we need to use to create a program, and how it is conventional to use the line numbers in increments of ten.

We have learned a little about programmable RAM memory and Read Only ROM. Because Ram is volatile, we need to save programs to a storage system in order to retrieve them at a later date

We saw how to save and load a program, and how to display the list of a program in memory.

A REMARK OR REMINOER

When we are writing long sections of code we often find the need to emplace comments within our code to remind ourselves just what this or that piece of code might be doing or what a variable label may stand for etc. To enable us to do this the Keyword, REM (REMark), has thoughtfully been incorporated into the language. When we run a program and the processor comes across the REM statement it will ignore it and anything which may follow it on the same line. Here are a few examples of the REM statement in use:

```
10 REM *** PROGRAM NO 1 ***
20 PRINT "HELLO WORLD"
30 END
```

```
10 PRINT "HELLO WORLD"
20 REM - THIS PROGRAM PRINTS, HELLO WORLD,
THEN ENDS
30 END
```

```
10 LET X = 35 : REM - SPRITE X POSITION
20 LET Y = 70 : REM - SPRITE Y POSITION
30 REM - MAIN PROGRAM FOLLOWS
```

When we have finished our program and are satisfied that it is working well, and that no bugs, or errors exist within it, then we usually save a version of the program with all the REMs removed. This does help to speed up processor execution time, and also returns us with memory. We can, also, if our program is too B I G and we need to recover some memory, remove some or all of the REM statements.

ARITHMETIC EXPRESSIONS

+ Addition
- Subtraction
*** Multiplication**
/ Division
(up errow) Exponentiation

RELATIONAL OPERATORS

= Equal to
< Less then
> Greeter than
<= Less than or equal to
>= Greater than or equel to
<> Not equel to

SOMETHING ABOUT LINE EOIT

If you have typed in a routine and find you need to delete an entire line of code, simply move the cursor to a free area of the screen and type in the line number you wish removed. When you list the program, hey presto! the line has gone. Remember from earlier in the series how I told you that you can also edit any mistakes on a line by simply moving the cursor onto the offending mistake and typing over it!

You can also replace an entire line by just typing in the line number and the sratements to go on it, for example, say we had this line:

150 X = 20 :IF N <> 30 THEN X = 10

which is not required, we simply type in a newline, thus:

150 X = 10

The old one has gone, replaced with the new one.

Another useful trick is line duplication. Say we had several lines which carried virtually, if not the same,

information - and they can be spread around our program, it is not necessary for them to be consecutive - we can place the cursor over the line number of the line which we desire to copy, or duplicate, and overtype this number with the new line number

10 PRINT "THE RESULT OE THE EQUATION IS" N

Cursor over the 10 and change it to 30, or some such number (you then must press return). Now when you list the program you will discover that you have two lines identical, except for different line numbers. If the variable needs to be changed (in our example, although it could be anything else), simply overtype the old variable label, or whatever, with the new one before you press return.

A line such as this:

10 PRINT "[SHIFT.CLR/HOME]"

will clear the screen and send the cursor to the top left corner (the home position). Now I have placed what it is you need to do in the square brackets - you don't actually type in [SHIFT CLR/HOME], you simply press the shift key and the CLR/HOME key at the same time. this will print a reversed heart symbol.

You could include this command in a line of printed text which will clear the screen before the text is printed:

10 PRINT "[SHIFT.CLR/HOME] THE SCREEN CLEAR IN OPERATION"
Try it!

A FIRST LOOK AT ARRAYS

An ARRAY can be visualised as a container or large box which is then sub-divided into a predetermined number of pigeon-holes. We can then label the entire container with a name, and also number each of the pigeon-holes. For example, we might call the container, AA, and it might consist of five pigeon-holes which are empty, or carry the value of zero:

```
AA
0 : 0 :
1 : 0 :
2 : 0 :
3 : 0 :
4 : 0 :
```

We can drop the term pigeon-hole and use the more conventional term, element. So our array is, then, a five element array which we have labelled, AA.
If we now want to store a value in any particular element of the array we can identify the one we require by simply stating something like; AA of element 3, or AA of element 1, etc This can be directly translated to the computer by replacing the words "of element" with brackets around the element number, thus:

AA(3) or AA(1) etc.

The computer understands this to mean the third, or first position within the array called AA. This means we can fill the array with any number we might require, for example a line such as this:

10 AA(0) = 10 :AA(1) = 20 :AA(2) = 100 :AA (3) = 200 :AA(4) = 2

will fill the array with those values, so if we now visualise the array it would look something like this:

```
AA
0 : 10 :
1 : 20 :
2 : 100 :
3 : 200 :
4 :  2 :
```

It is possible to take values from each element of the array from anywhere within our program, change the values, or even emplace new values into the elements by using either the INPUT or LET command. Here are some examples:

```
20 X = AA(2)
30 X = X + 400: AA(2) = X
40 END
```

Without actually typing in this program and RUNning it, can you determine what the element 2 of the array will hold when the program terminates at line 40?

```
20 PRINT AA(3)
30 AA(3) = AA(3) + 10
40 END
```

Can you say what value would be printed to the screen, and what value will be contained in element 3 on termination?

```
20 INPUT "TYPE IN YOUR AGE PLEASE"; AA(0)
30 AA(4) = AA(0)
40 END
```

In this final example what value will element 0 and 4 contain at conclusion?

You can, if you wish, type in each program and check your results.

DIM THAT ARRAY

Remember how earlier on in the series I explained to you that the computer would set aside a part of its memory, above the program, and within which it would store the various variables and constant data that you might use within the program. For small arrays of up to eight elements this holds true - you have no need to worry about the data, it is taken care of automatically. It was for this reason I confined the size of our first look at arrays to only five elements.

What this means is that if you wish to use arrays which have a much larger capacity that eight elements, you must tell the computer how large they are going to be. The computer will then "set aside" the necessary storage space. From this you will gather that you must know in advance roughly how 'big' your array is going to be. You can, of course, make adjustments, as you develop your program. However, to tell the computer to set aside this memory we use the keyword, DIM, which means Dimension an array. As well as the DIM keyword we also need to tell the computer the name of the array, and how large it is going to be, for example.

```
10 DIM AA(20)
```

will set aside 20 elements for data.

When we DIMension the array it is common to think, how many elements do I require? Twenty, so DIM AA(20). Now when we refer to these elements of AA(20), we must remember to use subscripts (this is the element index) from between zero and nineteen (the first element is zero and the last is 19).

We can now write a small program which will create a small array, manipulate the variables held within the elements and then print the result to the screen.

```
10 DIM AA(10): REM 10 ELEMENTS FROM 0 TO 9
20 FOR X = 0 TO 9
30 INPUT NUM
40 AA(X) = NUM * 10
50 NEXT X
60 FOR X = 0 TO 9
70 PRINT "ARRAY AA("X") CONTAINS -"AA(X)
80 NEXT
90 END
```

LINE 10 Dimensions the array to ten elements.

LINE 20 Opens our first loop of subscripts.

LINE 30 Input request stored in the variable NUM.

LINE 40 Fills the Xth element of the array AA with NUM multiplied by 10

LINE 50 Increments X, if less than ten it will continue to loop otherwise go to line 60.

LINE 60 Opens our second loop of subscripts.

LINE 70 This line will print the value in each element. Note the way in which the print line is structured with "ARRAY AA(" in quotes letting the computer know this is a string to be printed, then the variable X (the element number) followed by a further string in quotes ") CONTAINS -", and finally the variable Xth element of the array AA(X).

LINE 80 Increments X, if less than ten it will continue to loop otherwise go to line 90.

LINE 90 Terminates the program.

The DIM statements you may use in your program should always be situated somewhere right at the beginning of the program, and should you forget to DIM and array, or use more subscripts than you dimensioned for, then you will receive the error message:

?BAD SUBSCRIPT ERROR IN <Line Number>

STRINGS AND MULTI-DIMENSIONS

So far we have only dealt with 'number' arrays, and only one dimensional arrays at that. The single dimensional array is really a sophisticated List of data, but, by using multiple dimensions, it is possible to create even more sophisticated Tables of data. We are not restricted to Arrays of numbers either, we can just as easily create Arrays of strings.

First, let us take a quick look at a two-dimensional array. This can be viewed as two single lists put together We declare the array as:

```
DIM AA(2,5)
```

The array can be visualised as thus:

AA

	X	0	1
	0	10	400
	1	20.50	500
Y	2	100	1000
	3	200	7.25
	4	2.10	67

To access any element within the array, we require the use of two sets of subscripts, namely the X or Columns

(horizontal) subscripts (in our array 0 and 1), and the Y or Rows (vertical) subscripts (0 through to 4). Let's put a small routine together which will fill the array, and print a list of the result.

```
10 DIM AA(2,5) : Z = 10
20 FOR X = 0 TO 1
30 FOR Y = 0 TO 4
40 AA(X,Y) = Z : Z = Z + 10
50 NEXT Y
60 NEXT X
70 PRINT " X"," Y","VALUE"
80 FOR X = 0 TO 1
90 FOR Y = 0 TO 4
100 PRINT X,Y,AA(X,Y)
110 NEXT Y
120 NEXT X
130 END
```

Let us now examine each of the program lines in detail and find out what exactly it is that the routine is doing

LINE 10 The first statement dimensions our two dimensional array. Then we place the colon to separate the commands. We then set a variable labelled, Z to equal ten.

LINE 20 Starts off the outer loop for the columns subscripts.

LINE 30 Starts off the inner loop for the rows subscripts. What this means is that the each element of a column will be filled before the row is incremented.

LINE 40 Fills each element of the array with the value of the variable Z, and the second statement on this line will add ten to the value of Z on each increment of the inner and outer loops of X and Y

LINE 50 and **60** Increment the FOR.. NEXT inner and outer loops

LINE 70 This command will print a top line of information under which will be printed the value of X, then Y and finally the value in the X/Y element. This line also introduces you to a method of formatting the printed output, namely the use of the comma (,).Using the comma to format is very useful in that it will force a tabulation by eight character spaces between each use of the comma (experiment with this).

LINE 80 and **90** Start the inner and outer FOR. .NEXT loops once more, ready to print our results.

LINE 100 Prints the results. First it will print the value of X in the left-hand column, this is followed by the formatting comma, then Y, followed by another formatting comma, then the content of the element of the array pointed to by the value of X/Y.

LINE 110 and **120** Increment the **FOR...NEXT** inner and outer loops.
LINE 130 Terminates the routine

Of course you can extend the parameters, or dimensions, of the array to any reasonable size - simply remember that the computer does have limited memory and if you dimension an array too large you will receive an error warning, namely, ?OUT OF MEMORY ERROR IN <line number>. Even if you don't receive this message initially, once you start to program more code, you may well run up against it. Large arrays eat lots of memory!

STRING ARRAYS.

All that has been said about number arrays is equally valid for string arrays. However, to let the computer know we are dealing with string arrays we need to use the string prefix of the dollar sign. Thus.

```
10 DIM AA$(5)
20 AA$(0) = "YOUR NAME"
30 AA$(1) = "YOUR ADDRESS"
   ETC.
```

We can also use multi-dimensional string arrays just the same as we could with multi-dimensional number arrays. An example of their use which springs to mind might be as a name and address data base.

For something like this you would set up a series of 'fields' for each item in the name and address data base. Something like, NAME field, STREET field, TOWN/CITY field, COUNTY field, POSTCODE field, TELEPHONE No field, and perhaps a COMMENTS field. This would give the array seven columns, or fields, and if you chose to allow enough space for say 100 separate people, or records, then you would dimension the string array as:

```
10 DB$(7,100) :REM 7 FIELDS BY 100 RECORDS - DB = DATABASE
```

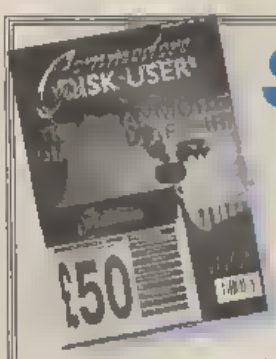
We cannot mix number variable with strings in the same array. Each type must have its own array. Of course a string can consist of numbers, but they won't be variable, such as a telephone number for instance. 01 234 5678. If you do require tables which require string information as well as variable information then the simplest thing to do is ensure that the rows of each array (string and number) correspond with each other. For example in a game environment you may want to keep a record of each players name, and their current score. This would be achieved by setting up two arrays, one to hold the names, and the other to hold the variable scores, such as:

```
10 DIM NAME$(10): DIM SCORES(10)
```

Now, when you want to print both the name and the score then the subscript for both will be the same

```
1000 FOR X = 0 TO 9
1010 PRINT NAME$(X) "SCORE IS " SCORE(X)
1020 NEXT X
REST OF PROGRAM
```

THAT'S IT FOR THIS MONTH. NEXT MONTH WE WILL LOOK AT THE "READ" STATEMENT.....J.S.



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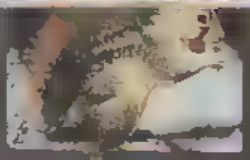

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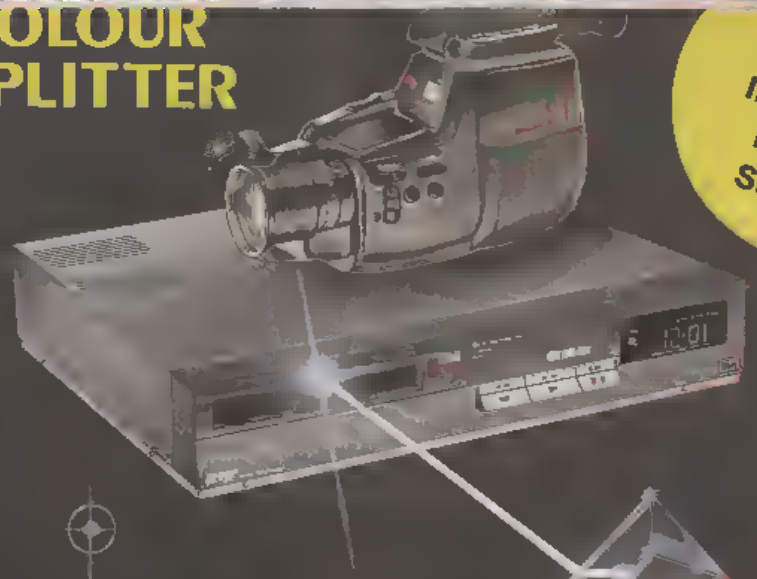

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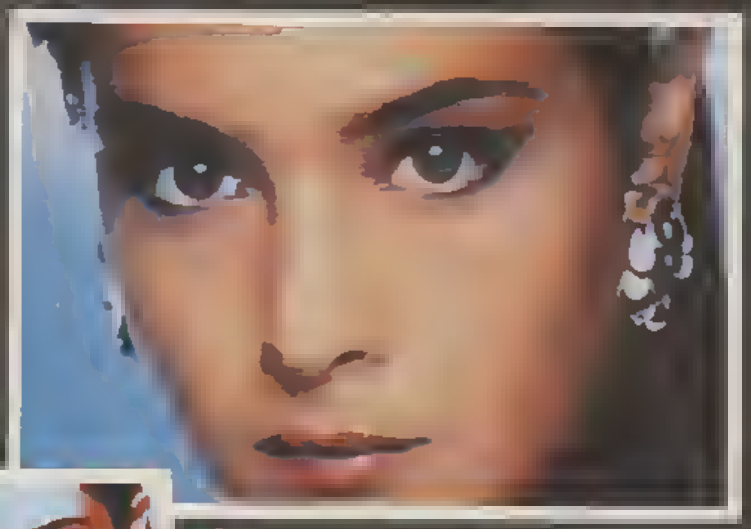

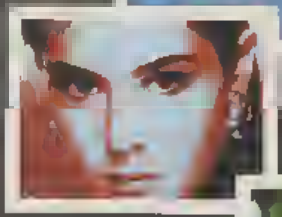

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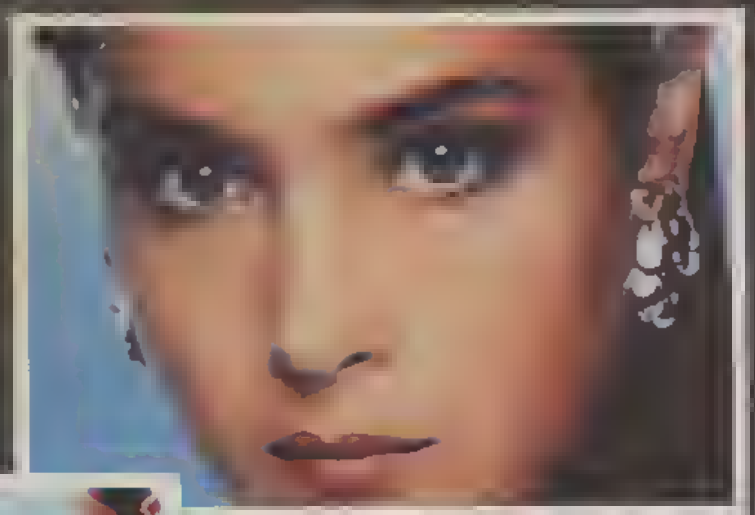

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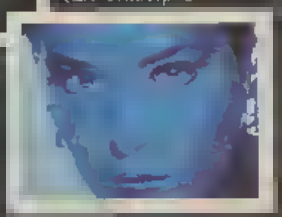

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